

"GRIZZLIES" PREMIERES ON EXPLORER, CNBC, JULY 22, 8 P.M. ET/PT

NATIONALGEOGRAPHIC.COM

JULY 2001

NATIONAL GEOGRAPHIC

Grizzly

Cornered!

Marco Polo III
Homeward Bound 26

Urban Sprawl
The American Dream? 48

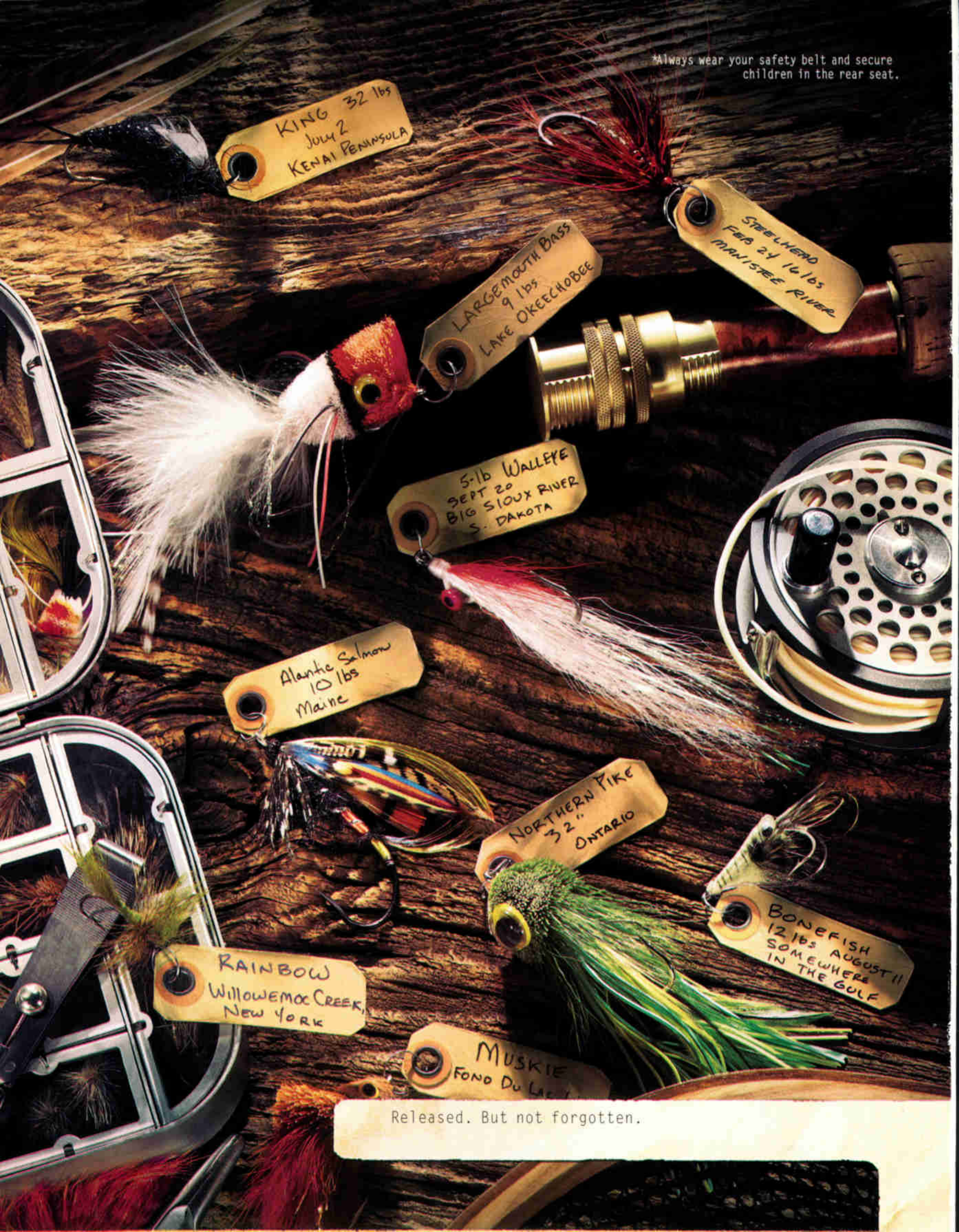
Cuba's Gold
Treasure From
Sunken Galleons 74
Plus: Map Supplement

Monhegan Island
Cool Welcome
in Maine 92

Kingdom of Aksum
Ethiopia's Keepers
of the Faith 110

ZipUSA: 70085
On the Bayou in
Delacroix, LA 126

*Always wear your safety belt and secure children in the rear seat.



KING 32 lbs
July 2
KENAI PENINSULA

LARGEMOUTH BASS
9 lbs
LAKE OKEECHOBEE

STEELHEAD
Feb 24 16 lbs
MANISTEE RIVER

5-lb WALLEYE
SEPT 20
BIG SIOUX RIVER
S. DAKOTA

Atlantic Salmon
10 lbs
Maine

NORTHERN PIKE
32"
ONTARIO

BONEFISH
12 lbs AUGUST 11
SOMEWHERE
IN THE GULF

RAINBOW
WILLOWemoc CREEK
New York

MUSKIE
FOND DU LAC

Released. But not forgotten.

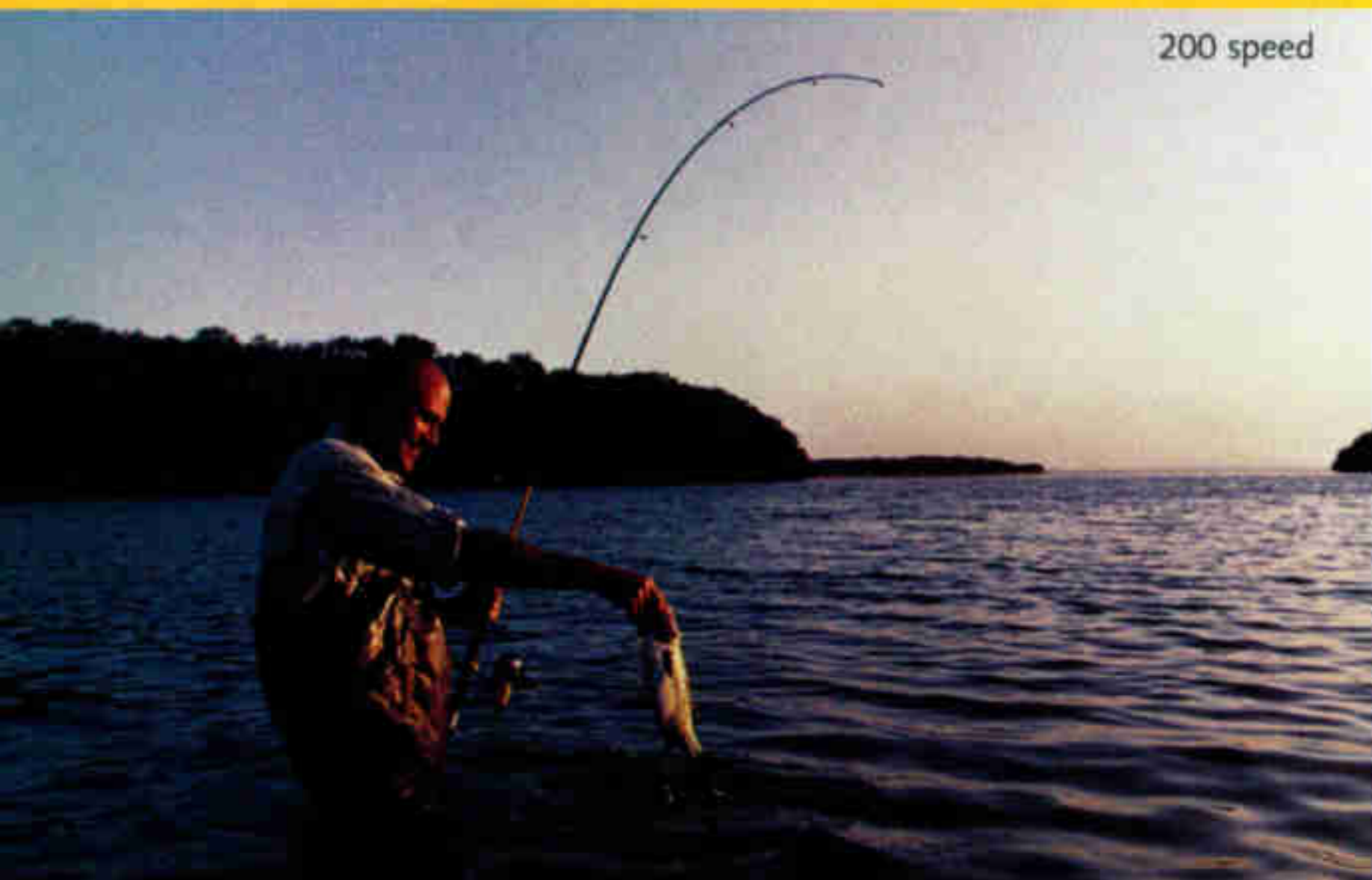


Smoother. Roomier. More powerful.
New Independent Rear Suspension (IRS) System.
7-passenger seating with new, optional third row.
New, optional side curtain airbags*.
New, optional all-aluminum 239-hp V8.
More info? 800-392-FORD
or visit www.fordoutfitters.com.

INTRODUCING THE ALL-NEW
FORD EXPLORER 02
THE NEXT TERRITORY

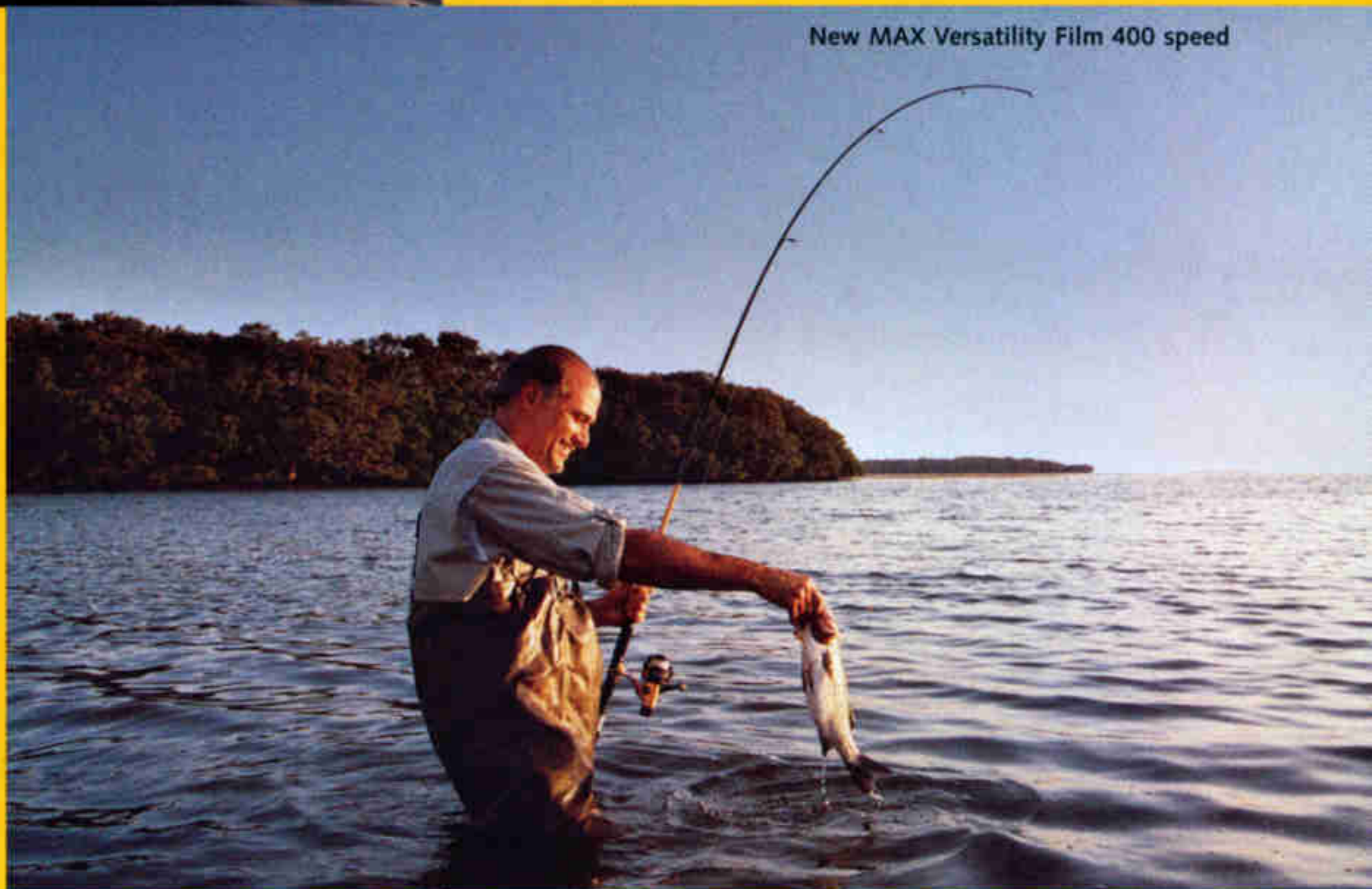


NO BOUNDARIES
FORD OUTFITTERS



200 speed

- ☑ Low light
- ☑ Fading light
- ☑ Weekend highlight



New MAX Versatility Film 400 speed

Get brighter pictures with new KODAK MAX Film. It's better than lower-speed films in low light, so up to 25% of your photos will be improved. Catch the best moments in almost any light.



Share Moments. Share Life.™

Contents



Marco Polo—26

FEATURES

- 2 Grizzlies** Rulers of the wilderness, these intelligent and adaptable brown bears face shrinking ranges due to escalating human demands.
BY DOUGLAS H. CHADWICK PHOTOGRAPHS BY JOEL SARTORE
- 26 Marco Polo's Voyage Home** Sailing the treacherous coast of Southeast Asia and India, Marco returns to Venice after 24 years, rich in gems and wild tales of unimagined lands.
BY MIKE EDWARDS PHOTOGRAPHS BY MICHAEL YAMASHITA
- 48 Urban Sprawl** Most people agree that unchecked development is a bad deal—for commuters, for taxpayers, for the environment. But few can agree on how to achieve smart growth.
BY JOHN G. MITCHELL PHOTOGRAPHS BY SARAH LEEN
- 74 Cuba's Golden Past** Havana's glittering era as Spain's premier New World port gleams in treasures rescued from the sea.
BY THOMAS B. ALLEN PHOTOGRAPHS BY IRA BLOCK
Map Supplement Sunken Treasures/Treasures of the World
- 92 Monhegan Island** Twelve miles off Maine, a refuge of solitary painters and lobstermen weathers a tide of summer tourists.
BY CATHY NEWMAN PHOTOGRAPHS BY AMY TOENSING
- 110 Kingdom of Aksum** Ethiopia's Christians still flock to the intricate stone churches of the highlands where their faith arose.
BY CANDICE S. MILLARD PHOTOGRAPHS BY GEORGE STEINMETZ
- 126 ZipUSA: Delacroix** Spanish roots anchor this flood-prone Louisiana island. Hauling sandbags is as natural as hauling shrimp.
BY JOEL BOURNE, JR. PHOTOGRAPHS BY MEDFORD TAYLOR

DEPARTMENTS

From the Editor
Forum
EarthPulse
Geographica
Behind the Scenes
nationalgeographic.com
National Geographic TV
Ask Us

Final Edit
On Assignment
Flashback

THE COVER

Brody, a bear trained for the entertainment industry, brandishes monster fangs as his trainer tosses him salmon.
 PHOTOGRAPH BY
 JOEL SARTORE

MORE INFORMATION

MEMBERSHIP Please call 1-800-NGS-LINE (1-800-647-5463). Special device for the hearing-impaired (TDD) 1-800-548-9797. Online: nationalgeographic.com/ngm

♻️ Cover printed on recycled-content paper

From the Editor

WILLIAM L. ALLEN
Editor in Chief

ROBERT M. POOLE, *Executive Editor*
ROBERT L. BOOTH, *Managing Editor*

SENIOR EDITORS

DON BELT, *Exploration*
JUDITH BROWN, *Production*
WILLIAM T. DOUTHITT, *Special Projects*
JOHN A. ECHAVE, *Research Grant Projects*
RICK GORE, *Science*
DAVID JEFFERY, *Legends*
KENT J. KOBERSTEEN, *Photography*
JOHN G. MITCHELL, *Environment*
BERNARD OHANIAN, *International Editions*
OLIVER PAYNE, *Manuscripts*
CONSTANCE H. PHELPS, *Design*
LESLEY B. ROGERS, *Research*
W. ALLAN ROYCE, *Illustrations*
CHRISTOPHER P. SLOAN, *Art*

EDITORIAL

Assistant Editors: Mike Edwards, Lisa Moore LaRoe, Peter L. Porteous, Joel L. Swerdlow, Jane Vessels.
Senior Writers: John L. Eliot, Cathy Newman, Tom O'Neill, Cliff Tarp, Prit J. Vesilind. **Senior Editorial Staff:** Lynn Addison, Judith F. Bell, Carol B. Lutyk, Alan Mairson, Glenn Oeland, Jennifer Reek, Boris Weintraub, A. R. Williams, Margaret G. Zackowitz.
Editorial Staff: Glenn Hodges, Hillel J. Hoffmann, Karen E. Lange, Candice S. Millard, Lynne Warren.
Research: Michaeline A. Sweeney, *Assoc. Director*; **Senior Researchers:** Alice J. Dunn, Kathy B. Maher, Barbara W. McConnell, Jeanne E. Peters, Abigail A. Tipton. **Researchers:** Elizabeth Connell, Michelle R. Harris, P. Davida Kales, Patricia B. Kellogg, Eileen A. Yam. **Legends:** Victoria C. Ducheneaux, Susan A. Franques. **Planning Council:** Mary McPeak, David W. Wooddell. **Online:** Valerie A. May, *Director*; Cassandra Franklin-Barbajosa

ILLUSTRATIONS

Photography: Susan A. Smith, *Asst. Director*; Sam Abell, William Albert Allard, Jodi Cobb, Chris Johns, Michael Nichols. **Studio:** Mark Thiessen. **Photo Engineering:** Lawrence B. Maurer. **Illustrations Editors:** Dennis R. Dimick, *Asst. Director*; Bert L. Fox, Todd James, Elizabeth Krist, Bruce A. McElfresh, Kathy Moran, Kurt F. Mutchler, Christopher Scaptura, Susan Welchman. **Design:** Robert Gray, David C. Whitmore, *Asst. Directors*; Elaine H. Bradley. **Typography:** Jennifer C. Christiansen, Betty Clayman-DeAtley. **Art:** Jeffrey L. Osborn, *Asst. Director*; Christopher A. Klein, *Artist*; Darcy J. Bellido de Luna, *Research*. **Engraving and Printing:** Janet C. Evans, *Director*; George Bounelis, Judy L. Garvey, William D. Reicherts

EDITORIAL SERVICES

Administration: Marisa Domeyko, *Staff*; Maria-Teresa Lawrence, *Business Manager*; Brian E. Strauss, *Electronic Publishing*; Sandra M. Dane, Luz Garcia, Artemis S. Lampathakis. **Control Center:** Carol L. Dumont, *Director*. **Image Collection:** Maura A. Mulvihill, *Vice President*; William D. Perry, *Sales*; Carolyn J. Harrison, John A. Rutter. **Information Services:** Carolyn F. Clewell, *Director*. **Correspondence:** Joseph M. Blanton, Jr., *Director*; Carol Stroud, Lisa Walker. **Libraries and Indexing:** Susan Fifer Canby, *Director*; Ann C. Benson, Renee Braden, Ellen D. Briscoe, Janet Dombrowski, Barbara P. Ferry, Anne Marie Houppert, Ann E. Hubbs. **Translations:** Kathryn A. Bazo, *Director*; Sigrid Block. **Public Affairs:** Mary Jeanne Jacobsen, *Director*; Barbara H. Fallon, Barbara S. Moffet. **Travel:** Ann C. Judge, *Director*

PRODUCTION SERVICES

Hans H. Wegner, *Director*. **Pre-Press:** Geoffrey T. McConnell, *Director*; Martin G. Anderson, Clayton R. Burneston, Phillip E. Plude, Bernard G. Quarrick. **Printing:** Joseph M. Anderson, Edward J. Holland, Ronald E. Williamson. **Quality:** Bill M. Aldridge, *Director*; Peg M. Crawford

MAGAZINE PUBLISHING

Advertising: Stephen P. Giannetti, *Vice President and Publisher*. **Associate Publishers:** Andrea Vaughan, Sean Flanagan. **International:** Michel Siegfried. **Regional Managers:** Philip G. Reynolds, *Midwest*; Lori Friesner, *Detroit*; Ron Bottorff, *West*; John Patten, *New York*; Rainer Jenss, *Southeast*. **Washington:** *Directors:* Pandora B. Todd, *Marketing*; Margaret Robertson, *Operations*; Gail M. Jackson, *Production*. **Business and Finance:** *Vice President:* Sarita L. Moffat. **Circulation:** *Vice President:* Kitty Carroll Colbert. *Directors:* Elizabeth M. Safford, *North America*; John A. Seeley, *International*. **Member Services:** *Directors:* Christina C. Alberghini, *North America*; Myra A. McLellan, *International*



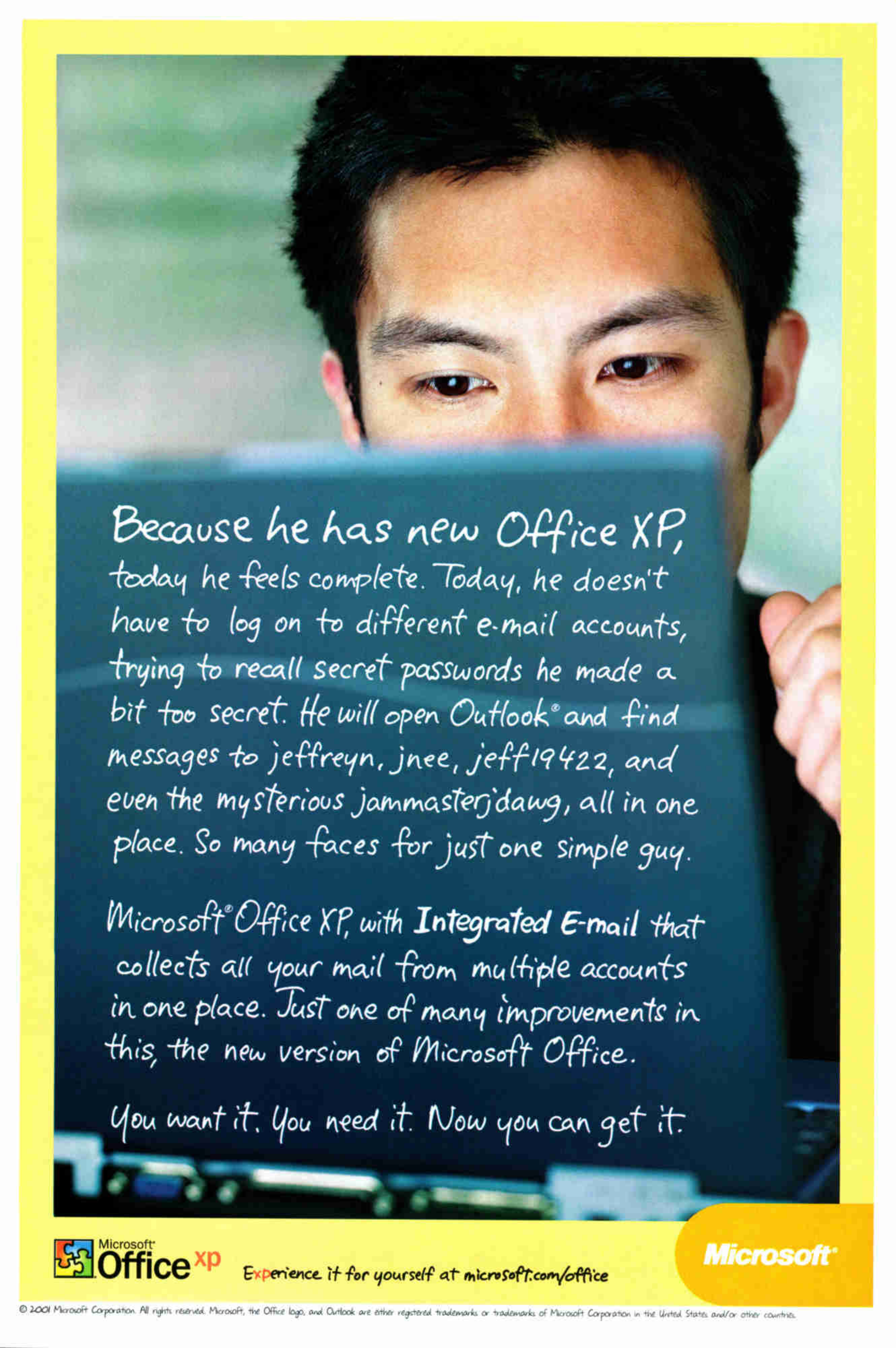
IRA BLOCK

If “X” marks the spot on a treasure map, then the world’s biggest X should mark the reef-infested, hurricane-prone waters surrounding Havana, Cuba. For more than 200 years a tide of gold and silver plundered by the conquistadores from the Inca and Mesoamerican Indians flowed through the port on its way to the royal treasury in Spain. But many ships foundered, and untold treasure sank beneath the warm waves and shifting white sands.

To reveal the rich history of the treasure fleets, I asked Senior Editor John Echave to return to his native Cuba and work with Cuban officials to help make this story possible. Photographer Ira Block and writer Tom Allen followed, spending weeks surrounded by precious artifacts and pouring over dusty archives.

I’m happy to say that some of the treasure photographed here for the first time will be displayed in Old Havana in a museum rebuilt by City Historian Eusebio Leal Spengler. While the brutality of the conquest of the New World still appalls us down the centuries, we can be proud of the effort to preserve this treasure for future generations. May it serve, in part, as a memorial to those whose heritage was taken from them.

Bill Allen

A close-up photograph of a man's face, looking directly at the camera. He is holding a computer monitor in front of his chest, which is the background for the text. The monitor is dark, and the text is written in a white, handwritten-style font. The overall image has a yellow border.

Because he has new Office XP, today he feels complete. Today, he doesn't have to log on to different e-mail accounts, trying to recall secret passwords he made a bit too secret. He will open Outlook® and find messages to jeffreyn, jnee, jeff19422, and even the mysterious jammasterjdawg, all in one place. So many faces for just one simple guy.

Microsoft® Office XP, with **Integrated E-mail** that collects all your mail from multiple accounts in one place. Just one of many improvements in this, the new version of Microsoft Office.

You want it. You need it. Now you can get it.



Experience it for yourself at microsoft.com/office

Microsoft®

Forum



NATIONAL GEOGRAPHIC SOCIETY

"For the increase and diffusion of geographic knowledge."

The National Geographic Society is chartered in Washington, D.C., as a nonprofit scientific and educational organization. Since 1888 the Society has supported more than 7,000 explorations and research projects, adding to knowledge of earth, sea, and sky.

JOHN M. FAHEY, JR., *President and CEO*

Executive Vice Presidents

TERRENCE B. ADAMSON

TERRY D. GARCIA, *Mission Programs*

NINA D. HOFFMAN, *President, Books and School Publishing Group*

CHRISTOPHER A. LIEDEL, *CFO*

ROBERT B. SIMS, *President, Magazine Group*

BOARD OF TRUSTEES

GILBERT M. GROSVENOR, *Chairman*

REG MURPHY, *Vice Chairman*

JOAN ABRAHAMSON, WILLIAM L. ALLEN, THOMAS E. BOLGER, LEWIS M. BRANSCOMB, J. CARTER BROWN, MARTHA E. CHURCH, MICHAEL COLLINS, JOHN M. FAHEY, JR., JAMES H. GILLIAM, JR., JOHN JAY ISELIN, JAMES C. KAUTZ, J. WILLARD MARRIOTT, JR., FLORETTA DUKES MCKENZIE, PATRICK F. NOONAN, DENNIS R. PATRICK, NATHANIEL P. REED, WILLIAM K. REILLY, ROZANNE L. RIDGWAY, JAMES R. SASSER, B. FRANCIS SAUL II, GERD SCHULTE-HILLEN

TRUSTEES EMERITUS

Joe L. Albritton, Owen R. Anderson, Frank Borman, Robert L. Breeden, Lloyd H. Elliott, George M. Elsey, William Graves, Caryl P. Haskins, Mrs. Lyndon B. Johnson, Laurance S. Rockefeller, Robert C. Seamans, Jr., Frederick G. Vosburgh

RESEARCH AND EXPLORATION COMMITTEE

Peter H. Raven, *Chairman*; John M. Francis, *Vice Chairman and Executive Director*; Richard S. Williams, Jr., *Vice Chairman*; Martha E. Church, H. J. de Blij, William L. Graf, Nancy Knowlton, Stuart L. Pimm, William H. Schlesinger, George E. Stuart, Hans-Dieter Sues, George E. Watson, Henry T. Wright, Patricia C. Wright

EXPLORERS-IN-RESIDENCE

Stephen Ambrose, Robert Ballard, Wade Davis, Sylvia Earle, Jane Goodall, Johan Reinhard, Paul Sereno

MISSION PROGRAMS

Development: Anne D. Cowie. **Education Foundation:** Barbara A. Chow. **Exhibits:** Susan S. Norton. **Expeditions Council:** Rebecca Martin. **Geography Bee:** Mary Lee Elden. **Lectures:** P. Andrew van Duym, Gregory A. McGruder

School Publishing: Ericka Markman, *Sr. Vice President*. **International:** Robert W. Hernández, *Sr. Vice President*. **Human Resources:** Thomas A. Sabló, *Sr. Vice President*. **Communications:** Betty Hudson, *Sr. Vice President*

ADMINISTRATION

Finance: Michael J. Cole, *Controller*; H. Gregory Platts, *Treasurer*. **Law:** Susan Borke, Angelo M. Grima, Suzanne R. McDowell. **Membership and Marketing Services:** Mary P. Donohoe

NATIONAL GEOGRAPHIC VENTURES

C. RICHARD ALLEN, *President and CEO*

Television: Timothy T. Kelly, *President*. **National Geographic Channel:** David Haslingden, *President*. **International:** Laureen Ong, *President, U.S.*; Andrew C. Wilk, *Exec. Vice President, Programming*. **nationalgeographic.com:** Mitchell Praver, *President*. **Maps:** William L. Stoehr, *President*; Allen Carroll, *Chief Cartographer*. **Enterprises:** Linda Berkeley, *President*; Lynn Cutter, *Travel*; John Dumbacher, *Licensing*. **Finance:** Frances A. Marshall

Copyright © 2001 National Geographic Society. All rights reserved. NATIONAL GEOGRAPHIC and Yellow Border: Registered Trademarks © Marcas Registradas. NATIONAL GEOGRAPHIC assumes no responsibility for unsolicited materials.

March 2001

Our EarthPulse on the world's "Insatiable Appetites" for energy fueled a powerful response from readers. Defending North America's consumption, one wrote that since we produce more goods than any other region, we are "a net benefit to the world." Bemoaning the high cost of solar power, another reader said she "cannot afford to convert" and thus "doesn't have a chance to make a difference."



Megatransect II

As a longtime reader and Congo-phile, I am glued to your Michael Fay dispatches. And in spite of all, I wish I was in the field with his team.

ERICKA HAMBURG
Brooklyn, New York

I do not mean to question the caliber of Michael Fay nor the value of his work, which is phenomenal. But none of the work would have been possible without the Africans on his team. Be it the Inuit of the Arctic or the Pygmies of Africa, native peoples have a reservoir of hard-earned knowledge. It's time scientific expeditions assigned more respectable roles to them.

VENKATESH SOSLE
Montreal, Canada

Michael Fay responds: I agree. Without the African team members the vision was futile; with them we all accomplished our goal. These men are very proud of their achievement, and several have gone on to work with the conservation community.

Great article. I could feel the heat and the suck of the muck on Fay's sandals.

STEVEN G. McCLOY
Barrington, Rhode Island

There is a bit of medical trivia on page 24 that should be clarified. The author says Mouko had hepatitis, not malaria, "since his urine was dark, the Quinimax brought no improvement, and his eyes were going yellow." All these symptoms are consistent with falciparum malaria, of which some strains are quinine resistant.

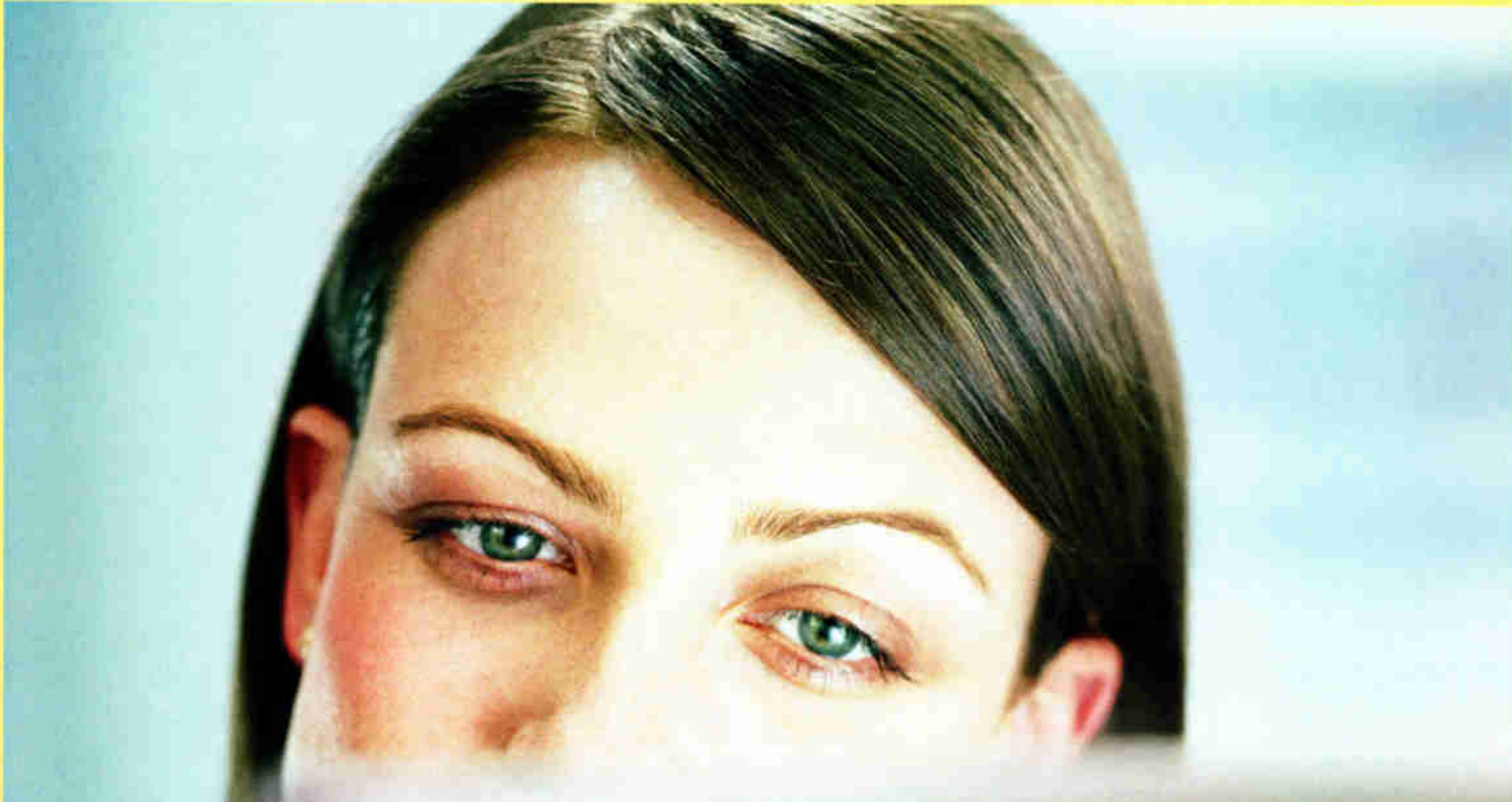
JERALD DONOVAN, M.D.
Irvine, California

The two diseases do have similar symptoms. Fay's diagnosis was later confirmed at the regional hospital in Makokou, Gabon.

Palmyra Atoll

I believe I am the only Air Force pilot alive who has made an emergency landing on Palmyra. In January 1945 my crew and I had serious mechanical failure over the ocean on our way from Hawaii to the island of Biak off the coast of New Guinea. How we found Palmyra without radios or radar, I don't know. But about 30 Navy personnel at the tiny base looked up and saw a B-24 bomber making a frantic approach to the narrow, unpaved landing strip. If Palmyra had not been there, I would not be here.

JACK P. DONAHUE
San Antonio, Texas



Because she has new Office XP, today she will get down to business. She won't waste time wading through a swamp of comments, deciphering which person wrote what note. She won't go through the nightmare of organizing everybody's revisions, because they'll all be combined into a single document. Today, she won't be a document juggler. A magician, perhaps, but not a juggler.

Microsoft® Office XP, with new Send for Review that combines people's comments and revisions into one document, so it's quick and easy. Just one of many improvements in this, the new version of Microsoft Office.

You want it. You need it. Now you can get it.



Experience it for yourself at microsoft.com/office

Microsoft®



ALEXANDRA BOULAT

Indonesia

I found Tracy Dahlby's article to be aptly timed at a moment when detailed coverage of the causes of violent outbreaks in Indonesia is called for.

ETHAN WILENSKY-LANFORD
Southwest Harbor, Maine

I was very sad to read about the racial disintegration in the Indonesian Spice Island of Ambon, which I visited in

1951 when the two communities lived peaceably side by side. I was invited to stay in a Christian village and then in a Muslim one. The head of the latter sent a bamboo band to escort me into his presence. I have never felt so regal.

NINA EPTON
Seaford, England

In his otherwise brilliant article the author failed to mention the role of the Chinese in Indonesia. The ethnic Chinese dominate the country's economy and have borne the brunt of the unrest. Ever since the 1965 coup the government has divided the population into *pribumis* (indigenous Indonesians) and Chinese in order to divert attention from the hostilities among the *pribumis*. In

this era of democracy it is very unfortunate that it takes violence in order for the world to hear the ethnic grievances among the *pribumis*. So far the Chinese have acted nonviolently in their struggle for human rights, and consequently their plight has been ignored.

HON PUI LAM
San Francisco, California

When I traveled through the Indonesian islands, I was amazed at the diversity of the people on those islands. Their struggle for a new government with equal representation for all reminds me of another country struggling to do the same in 1776. Good luck, Indonesia. There is hope.

JAMES PETERS
Virginia Beach, Virginia

Thank you for your article on Palmyra. It was our first stop on a sailboat cruise from Hawaii to the South Pacific. My most poignant memory is having a beautiful fairy tern hover just above my head looking me over, strange creature that I was, as I walked along the beach. I spent several hours on the old Navy runway among thousands of common terns. One, less than a yard from my foot, laid an egg, and I got a photo as she tucked it under her breast. It was indeed a paradise unlike anything I'd ever seen or will ever see again.

KATE HOLLAND GORMLEY
Bainbridge Island, Washington

WRITE TO FORUM

National Geographic Magazine, PO Box 98198, Washington, DC 20090-8198, or by fax to 202-828-5460, or via the Internet to ngsforum@nationalgeographic.com. Include name, address, and daytime telephone. Letters may be edited for clarity and space.

The article "The Treasured Islands of Palmyra" proves that everyone is on this Earth for a purpose. The people of the Nature Conservancy are all heroes. The ecosystem needs to be preserved, and even though this atoll is small, it's an extension of all environments around the world.

JOSE CAUSING
Vallejo, California

I was born during the war in the Pacific, when most of the islands there had just been found interesting by the industrialized world. Sixty years later it seems that only little Palmyra is left without essentially unrecoverable damage. It's absurd to call "the saving" of Palmyra a success when the great region of Oceania has been lost from the rolls of the biologically healthy. This is the same compartmentalized view of places and systems that supports and excuses the

destruction of ecologically healthy designs everywhere.

MICHAEL TINCHER
Santa Fe, New Mexico

Palmyra is indeed beautiful, but there is one problem with that paradise. Many of the fish, particularly large carnivores and even some small herbivores, are ciguatoxic. Visitors should be careful about eating seafood caught there, as ciguatera is a potent poison that can cause death.

SUS KATO
Larkspur, California

Access to Palmyra is monitored, and visitors are warned of the risk of ciguatera, which affects the nervous system, causing cramps, nausea, fever, and—rarely—death. The poison is harmless to the fish that carry it.

William Bartram

Thank you for the lovely opening pages and for the gentle

WE THE PEOPLE

of the

UNITED STATES

ARE SICK AND TIRED OF
GETTING THE RUN-AROUND
WHEN WE HAVE AN INSURANCE CLAIM.

INTRODUCING Encompass – a new brand of home and auto insurance (formerly known as CNA Personal Insurance). We believe when you have a claim, you should get fast, fair and friendly service. In fact, 9 out of 10

of our customers would recommend Encompass claims service to a friend.* To find out more, ask your Independent Insurance Agent. For the agent nearest you, call toll-free 1-866-760-6050 or visit encompassinsurance.com.



LIBERTY, JUSTICE, AND REALLY GOOD INSURANCE.

©2001 Encompass Holdings, LLC. Encompass Holdings, LLC is a subsidiary of Allstate Insurance Company, which is the exclusive administrator of the personal, auto and homeowners' insurance products issued through the insurance subsidiaries of CNA Financial Corporation. Home office: Chicago, IL. Subject to availability and qualifications.

*Results based on customers responding to satisfaction survey conducted after payment of claim.

dreamscape of the William Bartram article. Jill Enfield's subtle, hand-tinted tones on Annie Griffiths Belt's photograph of the lone canoeist, upheld by Julian Waters's lyrical calligraphy, caused me not only to pause but also to rest for several minutes on those mossy banks of the Georgia cypress swamp and contemplate its serene beauty.

DEBRA ANN HALBORN
Cortlandt Manor, New York

The Bartram article was beautifully illustrated, perhaps a landmark in magazine art. And Mr. Oeland, your writing was superb.

JEROME SKYRUD
Forgès, France

The profile of the seminal naturalist William Bartram was truly inspirational. He was a benevolent spirit who transcended his era through embracing reverence for all animate species. This profound man's simple philosophy was to respect the sacredness of all creatures because they emanate from a divine Supreme Being. Bartram was a valiant steward of planet Earth who merits historical prominence.

BRIEN COMERFORD
Glenview, Illinois

We live near the Bartram Trail in Florida and visited Paynes Prairie State Preserve after reading your article. You added to our visit by educating us on such names as Puc Puggy, or Flower Hunter. Thank you for giving us a better appreciation of Bartram's work.

NANCY CROWDER
Green Cove Springs, Florida

ZipUSA: Rico, Colorado

I want to give you the perspective of someone who spent time in Rico in the '60s and '70s. I

The snow would pile so high you couldn't see over the bank to the other side of the road. To get to school, the teacher's son would drive his snowmobile and allow all of us to tie tubes or sleds to the back.

remember the Enterprise as a family gathering place, not as a bar. Once a week the Sunday *Denver Post* was delivered there; it was the only way to get a paper. Rico also had a herd of horses that roamed the town. Residents let their horses join the herd and roam. When you wanted to ride, you just caught your horse and went. During the winters the snow would pile so high you couldn't see over the bank to the other side of the road. To get to school, the teacher's son would drive his snowmobile and allow all of us to tie tubes or sleds to the back. I believe my best educational experience was in tiny mountain schools like Rico's.

CHERYL YOUNG
Grand Junction, Colorado

This town is much more than a Main Street and bars. My ancestors worked the mines and the railroad, built their homes, raised their children, and, later, vacationed there. I spent every summer of my childhood in Rico. We would hunt for crystals, gather wild berries and mushrooms, camp, fish, play in the

hot springs, and hike. This is where my great-grandfather, in the motel he built, taught me to make a bed so neat that we could bounce a quarter off it.

REBECCA STANLEY-SWAGGERTY

Dolores, Colorado

EarthPulse

Thank you for "Insatiable Appetites." You state that renewables are the fastest growing new sources of energy; a huge percentage of an infinitesimal number, however, is still infinitesimal. Nuclear power is the only sensible answer to the problems you identify. The arguments against it focus on safety, but history shows that nuclear power has, despite Chernobyl and Three Mile Island, an admirable safety record, which will improve with newer processes.

WILLIAM C. CHAPMAN
Atlantic Beach, Florida

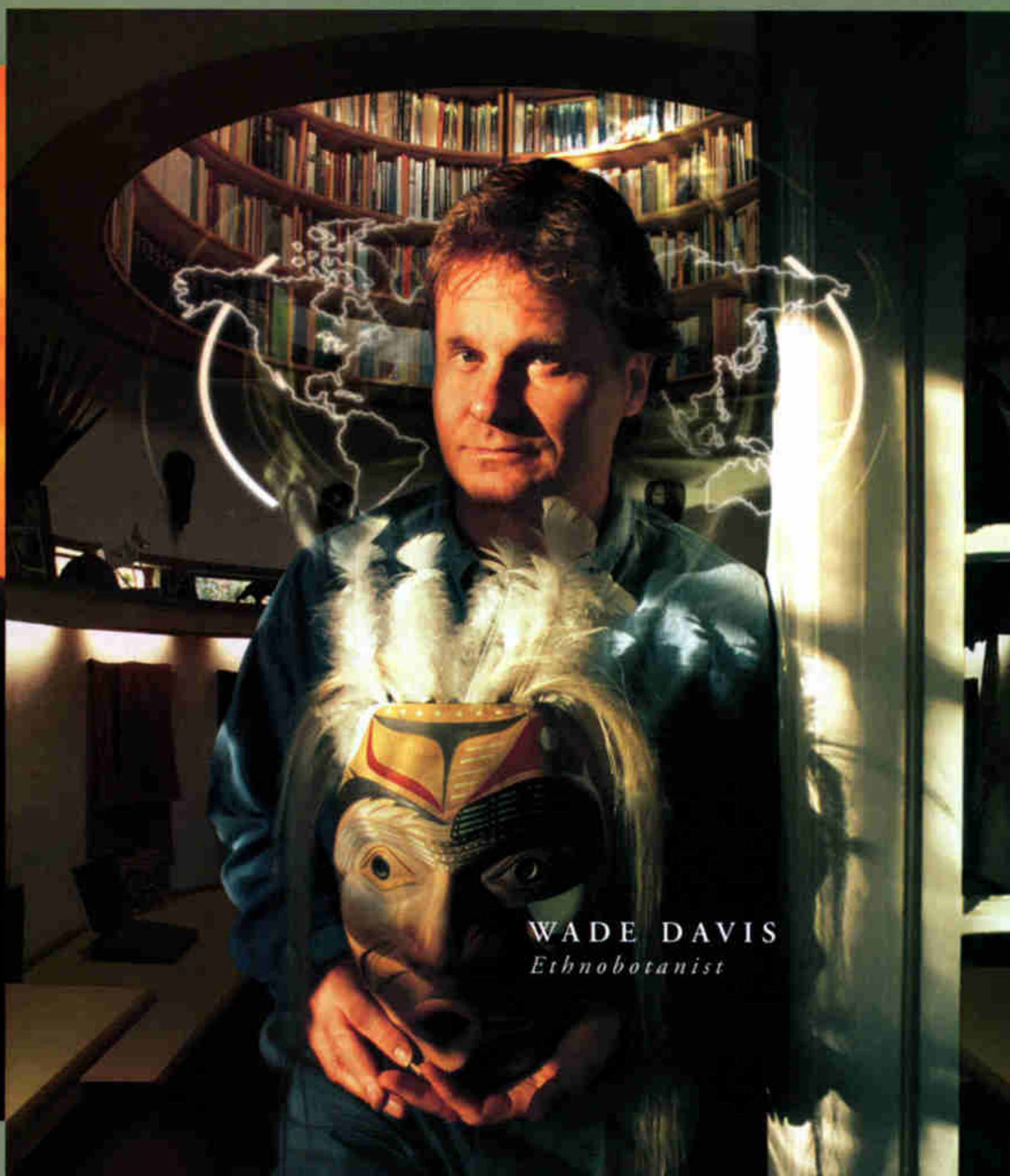
I believe you left out the largest available element in the renewable resources category: ethanol fuel produced from corn. It is used as an additive to gasoline, and in many vehicles it can be burned at much higher concentrations. A proposed ethanol refinery in Texas would be capable of producing 80 million gallons a year, with high-protein animal feed as a by-product.

JOHN E. ADAM
Hebron, Ohio

Though not mentioned specifically, ethanol was not left out of our statistics. It is included in the 14 percent of world energy that comes from biomass, which includes wood and agricultural products.

WE OCCASIONALLY MAKE OUR CUSTOMER LIST AVAILABLE TO CAREFULLY SCREENED COMPANIES WHOSE PRODUCTS OR SERVICES MAY BE OF INTEREST TO YOU. IF YOU PREFER NOT TO RECEIVE SUCH MAILINGS, U.S. AND CANADIAN CUSTOMERS PLEASE CALL 1-800-NGS-LINE (1-800-647-5463). INTERNATIONAL CUSTOMERS PLEASE CALL +1-813-979-6845 OR WRITE: NATIONAL GEOGRAPHIC SOCIETY, PO BOX 63005, TAMPA, FL 33663-3005. PLEASE INCLUDE THE ADDRESS AREA FROM YOUR MAGAZINE WRAPPER WHEN WRITING.

DID THE JOURNEY START WITH HIS HEART?



WADE DAVIS
Ethnobotanist

He grew up in the majesty of British Columbia. Lived extensively with indigenous people everywhere from the Amazon to the Arctic, Kenya to Tibet. Has authored several acclaimed books on his amazing experiences. Wanders the world over celebrating the enchantment of being human. And is dedicated to the survival of cultures, as well as preserving the poetry of diversity. 🌿 Dr. Wade Davis, anthropologist, writer, ethnobotanist, and National Geographic explorer-in-residence, is one of Ford Motor Company's Heroes for the Planet. A program that's part of ongoing Ford Motor Company initiatives to underwrite and support efforts that make the world a better place. 🌿 To learn more about Dr. Davis and other Heroes for the Planet, visit our website. You'll find fascinating information, including links to his favorite websites. Around the globe, there are amazing individuals who've dedicated their lives to our planet. You'll find them at www.ford.com/heroes. Stop by. The world is waiting.

HEROES FOR THE PLANET™

www.ford.com/heroes

Ford Motor Company



CONSERVATION

EarthPulse

POPULATION

We Leave More Than Footprints

Tracking the global impact of the haves and have-nots

The human race hurtled past another milestone in 1999 when world population exceeded the six-billion mark, doubling in less than 40 years. Earth's population is growing at an annual rate of 1.2 percent—77 million new mouths to feed each year. Although the fertility rate has fallen sharply in some countries, large numbers of women are reaching childbearing age. By 2050, the United Nations estimates, the global population will number between 7.9 billion and 10.9 billion.

Of the 6.1 billion people sharing the planet, one-fifth—represented by gold figures in this diagram—live in relatively affluent regions, including Europe, Japan, North America, and Australia. How much of the Earth do they use and pollute, compared with developing countries? The shadows cast by the figures below depict that impact, termed the ecological footprint. With less than five acres of productive land and water available per person worldwide for sustainable living, we are exceeding Earth's regenerative capacity.



● Developing countries
5 acres per person



Still Growing

The postwar baby boom is over, but the United States still has one of the highest growth rates of industrialized nations. Immigrants account for about a third of the growth. Now 285 million, the population may exceed 400 million by 2050.



African Giant

With an average of six children born to each woman, Nigeria is one of Africa's fastest growing nations and its most populous. By 2050 its current population of 114 million may explode to almost 300 million.



Rising Fast

In May 2000, India marked the birth of its billionth baby. Though family planning has been officially promoted since the 1950s, India will probably have 1.6 billion people by 2050 and pass China as the world's most populous nation.



● **Industrialized countries**
20 acres per person

● Ecological Footprint

Representing the productive area of the Earth required to support the lifestyle of one individual in a given population, the footprint estimates land used for crops, grazing, forest products, and housing and ocean area exploited for food. It also includes forests needed to absorb carbon dioxide from fossil fuel use. A footprint in industrialized countries is, on average, four times as big as in developing countries. Humankind now uses one-third more resources than nature can sustainably replenish.

Get Involved

For more information:

Redefining Progress

rprogress.org

Calculate your own ecological footprint!

PopPlanet

popplanet.org

PopNet

popnet.org

A comparison of the ecological footprints of different nations shows how per capita consumption in the United States and Germany overshadows that of Brazil, Indonesia, Nigeria, and India. In fact, the footprint of a person in the U.S. is more than ten times as big as that of a person in India.





The idea took shape during the energy crisis of '73. The result is an innovative, pollution-free, battery-powered city car. As part of an ongoing commitment to affordable alternative transportation for our consumers, we'll introduce the TH!NK city to the United States and Canada in 2002. The name itself asks you to consider what getting from here to there is all about every time you see one on the street.

TH!NK Marketing Whiz Kristi Hegna Eggen woos customers who share a distinctive point of view about how people ought to get where they're going.

Ford Motor Company

BETTER IDEAS.™

www.ford.com

go

WWW.FORD.COM

NOTE:

BETTER IDEA #6

No exhaust

UNITED STATES

Alternative transportation

doesn't always have to mean a boring
government study about commuter trains.

G E O G R

T H E P E O P L E , P L A C E S , A N D



ALL BY RICH REID, COLORS OF NATURE

CONSERVATION

New Park for California Coast?

Study could lead to national seashore

Wild and picturesque, a 76-mile-long stretch of California coast runs west of Santa Barbara, then bends north around Point Conception past Jalama Beach (opposite) to Point Sal. Called the Gaviota Coast, the shore and inland areas take in a variety of land uses from national forest to ranches to satellite launch sites at Vandenberg Air Force Base.

The area's beaches, mountains, and other habitats harbor 525 plant species, representing

half the families that grow in California. Forty of the area's vertebrate species are at risk. So a 200,000-acre tract is under study by the National Park Service to find ways of protecting habitat diversity, possibly by designating some of the land a national seashore.

"The real tussles are whether land will go to trophy homes and subdivisions or to permanent protection and compatible uses," says the service's Ray Murray.



Among the area's adornments (clockwise from above left): a rough-skinned newt, succulent lupine, and a bat star, all photographed on Arroyo Hondo Ranch. Conservationists hope to purchase the 782-acre ranch, with its riparian habitat that includes a trout stream with wild steelhead.

AFRICA

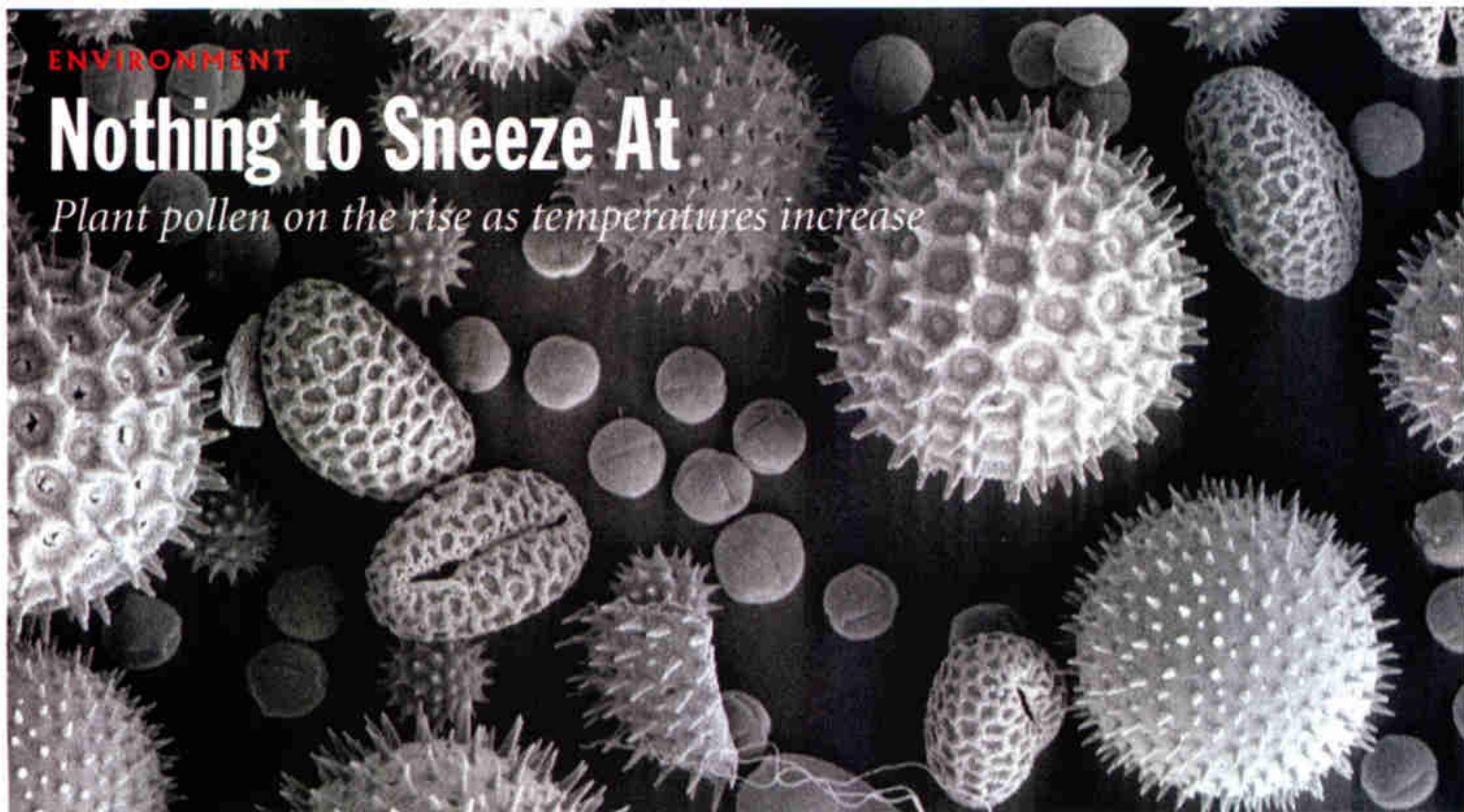
C R E A T U R E S O F O U R U N I V E R S E



ENVIRONMENT

Nothing to Sneeze At

Plant pollen on the rise as temperatures increase



LOUISA HOWARD, RIPPEL ELECTRON MICROSCOPE FACILITY, DARTMOUTH COLLEGE

Global warming may bring unforeseen trouble to an already beleaguered population: allergy sufferers. According to the USDA, rising carbon

dioxide levels in the air, a factor in the warming trend, are also causing an increase in the production of pollen. In tests, scientists grew ragweed plants

in atmospheres that simulated CO₂ levels of a century ago, of the present, and as projected for the future. At projected levels, plants produced more than four times as much pollen as they did at lower levels reflecting conditions in the past.

Lewis H. Ziska of the USDA cautions that “the CO₂ levels we used to simulate levels associated with warmer climates a hundred years from today are actually the norm in some cities right now.”



KENNETH GARRETT

■ NGS RESEARCH GRANT

Maya Tomb Finds

Archaeologist George Stuart reported in our December 1997 article “The Royal Crypts of Copán” that the Honduran site’s Hunal tomb might be the burial place of K’inich Yax K’uk’ Mo’, founder

of Copán’s royal dynasty, which flourished from about A.D. 400 to 850. New finds by a University of Pennsylvania team support the idea. The tomb has yielded the pectoral shown above with a shell animal figure. Glyphs inscribed on the pectoral may refer to the founder, according to Harvard University epigraphist David Stuart, George Stuart’s son.

ALMANAC

July

Timing is everything for little brown bats, a common species in the northern U.S. Though they mate in the fall, females store sperm to delay birth until June and July, when insects provide a feast for them and their young. A colony of 500 can devour 500,000 mosquito-size insects in an hour.



ART BY PETER GAEDE

Did you know

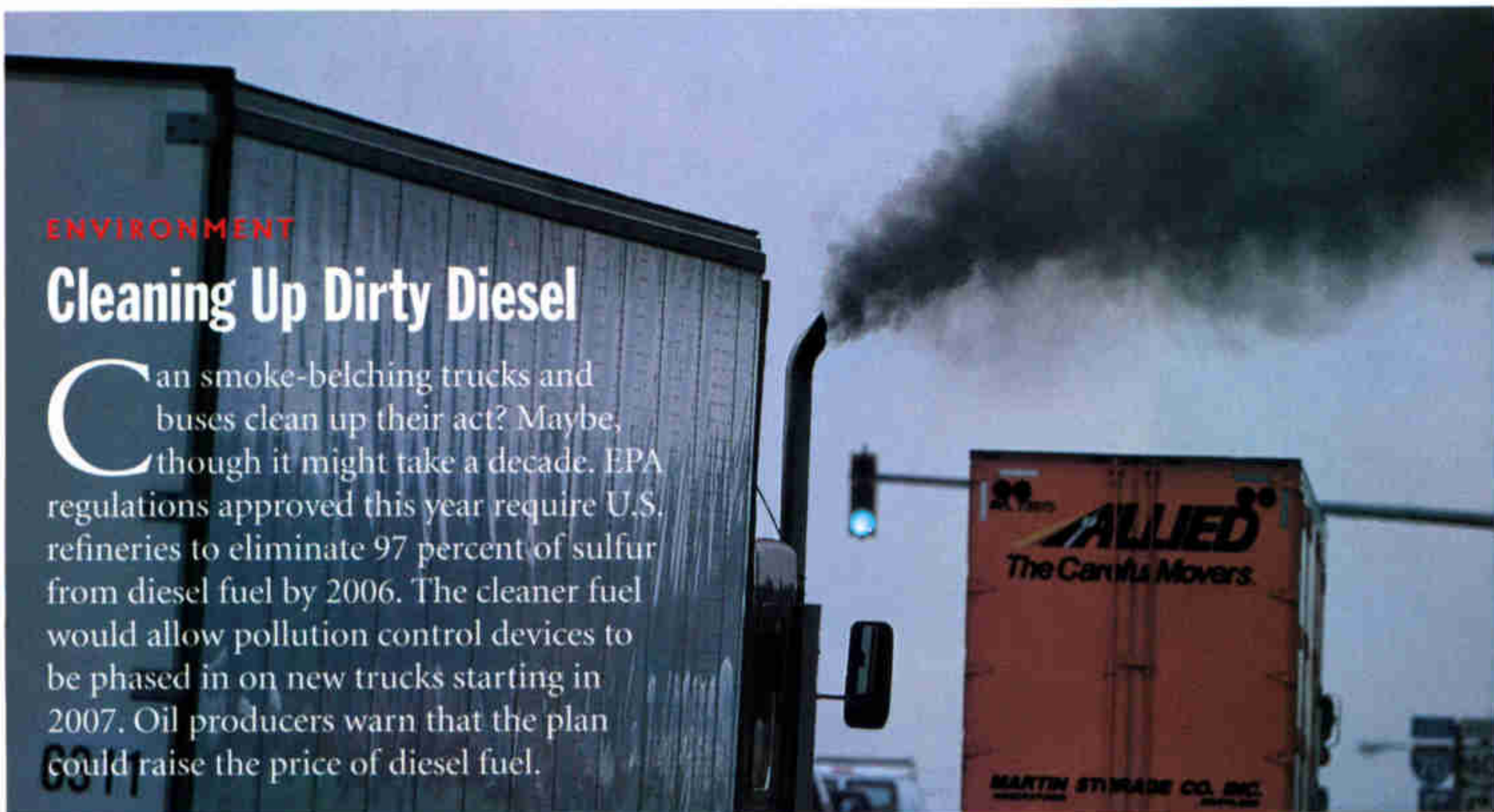
acid reflux

**could wear away the
lining of your esophagus?**

ENVIRONMENT

Cleaning Up Dirty Diesel

Can smoke-belching trucks and buses clean up their act? Maybe, though it might take a decade. EPA regulations approved this year require U.S. refineries to eliminate 97 percent of sulfur from diesel fuel by 2006. The cleaner fuel would allow pollution control devices to be phased in on new trucks starting in 2007. Oil producers warn that the plan could raise the price of diesel fuel.



NGS PHOTOGRAPHER MARK THIESSEN

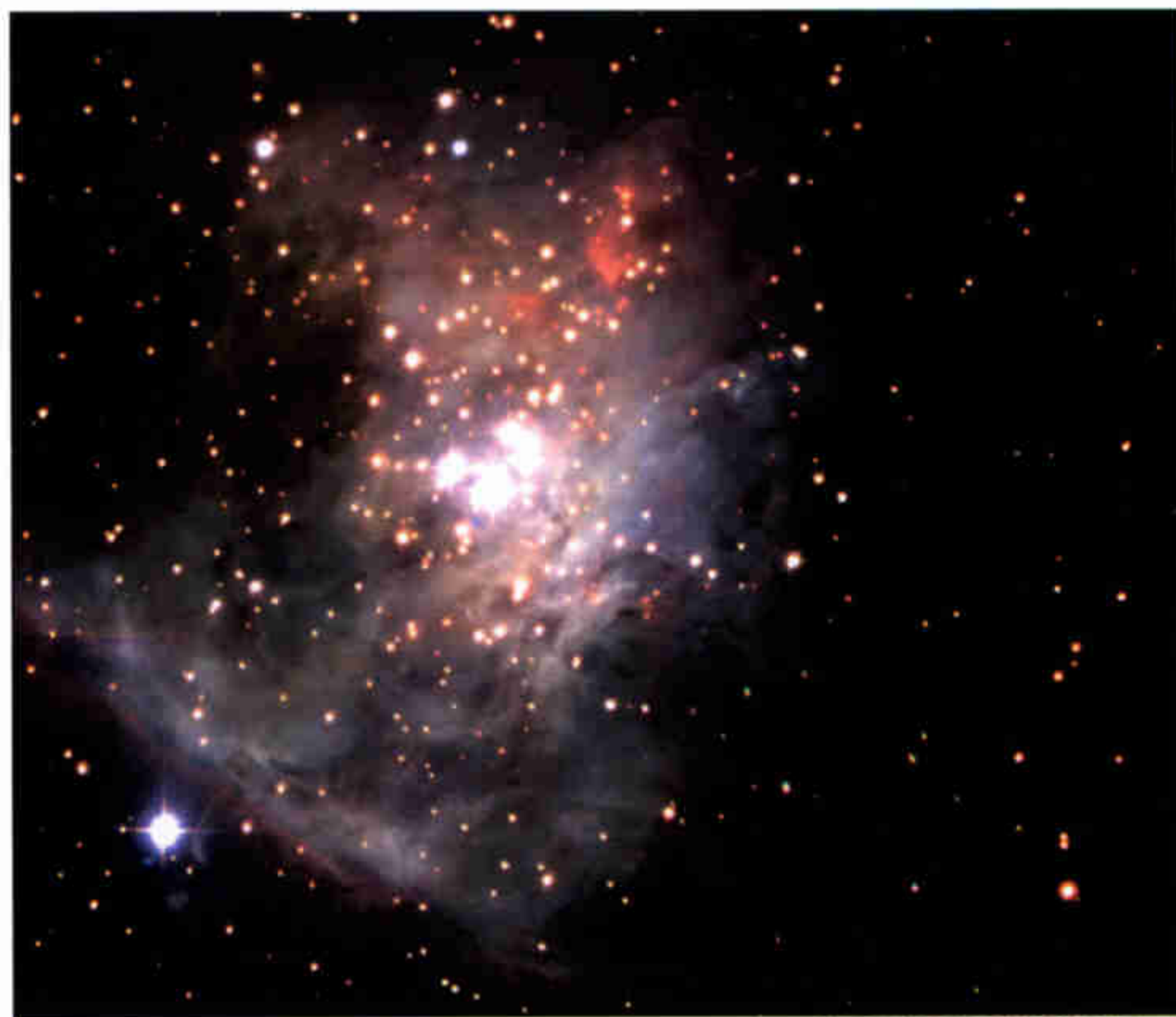
GEOGRAPHY

Pole Position

It's happened on the first of January for the past decade. Scientists at the United States' Amundsen-Scott South Pole Station use the global positioning system to set a new marker post at the geographic South Pole. Over the course of 365 days, shifting ice moves the marker about 30 feet from Earth's southernmost spot. Previous years' posts show the ice's progress over time. Though no marker remains from Roald Amundsen's expedition to the Pole in 1911, his would now be some 3,000 feet away from the current marker—and under more than 30 feet of snow.



ART BY JEFF MOORES



PHILIP LUCAS AND PATRICK ROCHE

ASTRONOMY

Brave New Worlds

Fifteen gas giants spotted 1,500 light-years from Earth in the Orion Nebula (above) have forced scientists to ponder the definition of a planet. British astronomers Philip Lucas and Patrick Roche found the bodies orphaned in space rather than orbiting parent stars. They likely began to form as stars themselves but never grew hot enough to trigger nuclear fusion. Instead they fizzled into warm globes of hydrogen more than eight times the mass of Jupiter.

The makers of Prilosec® (omeprazole)
proudly introduce

Nexium

**NEXIUM makes
relieving heartburn and
healing erosions of the
esophagus possible**

If you suffer from persistent heartburn 2 or more days a week, even though you've treated it and changed your diet, it may be due to acid reflux disease. And that can be serious. Because, over time, acid reflux can erode or wear away the delicate lining of your esophagus (erosive esophagitis). Only a doctor can determine if you have this damage.

For many people, prescription NEXIUM—once daily—provides complete resolution of heartburn symptoms and heals damaging erosions of the esophagus caused by acid reflux disease. Your results may vary.

The new purple pill

Talk with your doctor to see if NEXIUM is right for you. Most erosions heal in 4 to 8 weeks with NEXIUM.

The most common side effects of NEXIUM and Prilosec are headache, diarrhea, and abdominal pain. Symptom relief does not rule out serious stomach conditions.

Visit purplepill.com or call
1-888-PURPLEPILL
for more information.

AstraZeneca 

Please read the important Product Information about NEXIUM on the following page and discuss it with your doctor.

NEXIUM is a trademark and Prilosec is a registered trademark of the AstraZeneca group of companies.
© 2001 AstraZeneca LP. All rights reserved. 202592A 04/01


Nexium™
(esomeprazole magnesium)

Please read this summary carefully, and then ask your doctor about NEXIUM and PRILOSEC. No advertisement can provide all the information needed to prescribe a drug. This advertisement does not take the place of careful discussions with your doctor. Only your doctor has the training to weigh the risks and benefits of a prescription drug for you.

Nexium™ (esomeprazole magnesium)

20-MG, 40-MG Delayed-Release Capsules

BRIEF SUMMARY Before prescribing NEXIUM, please see full Prescribing Information.

INDICATIONS AND USAGE NEXIUM is indicated for the short-term treatment (4 to 8 weeks) in the healing and symptomatic resolution of diagnostically confirmed erosive esophagitis. **CONTRAINDICATIONS** NEXIUM is contraindicated in patients with known hypersensitivity to any component of the formulation or to substituted benzimidazoles.

PRECAUTIONS Symptomatic response to therapy with NEXIUM does not preclude the presence of gastric malignancy. Atrophic gastritis has been noted occasionally in gastric corpus biopsies from patients treated long-term with omeprazole, of which NEXIUM is an enantiomer.

Information for Patients: NEXIUM Delayed-Release Capsules should be taken at least one hour before meals. For patients who have difficulty swallowing capsules, one tablespoon of applesauce can be added to an empty bowl and the capsule opened, and the pellets carefully emptied onto the applesauce. The pellets should be mixed with the applesauce and then swallowed immediately. The applesauce used should not be hot and should be soft enough to be swallowed without chewing. The pellets should not be chewed or crushed. The pellet/applesauce mixture should not be stored for future use. Antacids may be used while taking NEXIUM. **DRUG INTERACTIONS** Esomeprazole is extensively metabolized in the liver by CYP2C19 and CYP3A4. *In vitro* and *in vivo* studies have shown that esomeprazole is not likely to inhibit CYPs 1A2, 2A6, 2C9, 2D6, 2E1 and 3A4. No clinically relevant interactions with drugs metabolized by these CYP enzymes would be expected. Drug interaction studies have shown that esomeprazole does not have any clinically significant interactions with phenytoin, warfarin, quinidine, clarithromycin or amoxicillin. Esomeprazole may potentially interfere with CYP2C19, the major esomeprazole-metabolizing enzyme. Coadministration of esomeprazole 30 mg and diazepam, a CYP2C19 substrate, resulted in a 45% decrease in clearance of diazepam. Increased plasma levels of diazepam were observed 12 hours after dosing and onwards. However, at that time, the plasma levels of diazepam were below the therapeutic interval, and thus this interaction is unlikely to be of clinical relevance. Coadministration of oral contraceptives, diazepam, phenytoin, or quinidine did not seem to change the pharmacokinetic profile of esomeprazole. Esomeprazole inhibits gastric acid secretion, therefore, it is theoretically possible that esomeprazole and omeprazole may interfere with absorption of drugs where gastric pH is an important determinant of their bioavailability (eg, ketoconazole, ampicillin esters, digoxin, and iron salts). **Carcinogenesis, Mutagenesis, Impairment of Fertility:** The carcinogenic potential of esomeprazole was assessed using omeprazole studies. In two 24-month carcinogenicity studies in rats, omeprazole at daily doses of 1.7, 3.4, 13.8, 44.0 and 140.8 mg/kg/day (about 0.7 to 57 times the human dose of 20 mg/day expressed on a body surface area basis) produced gastric ECL cell carcinoids in a dose-related manner in both male and female rats; the incidence of this effect was markedly higher in female rats, which had higher blood levels of omeprazole. Gastric carcinoids seldom occur in the untreated rat. In addition, ECL cell hyperplasia was present in all treated groups of both sexes. In one of these studies, female rats were treated with 13.8 mg omeprazole/kg/day (about 5.6 times the human dose on a body surface area basis) for 1 year, then followed for an additional year without the drug. No carcinoids were seen in these rats. An increased incidence of treatment-related ECL cell hyperplasia was observed at the end of 1 year (94% treated vs 10% controls). By the second year the difference between treated and control rats was much smaller (46% vs 26%) but still showed more hyperplasia in the treated group. Gastric adenocarcinoma was seen in one rat (2%). No similar tumor was seen in male or female rats treated for 2 years. For this strain of rat no similar tumor has been noted historically, but a finding involving only one tumor is difficult to interpret. A 78-week mouse carcinogenicity study of omeprazole did not show increased tumor occurrence, but the study was not conclusive. Esomeprazole was negative in the Ames mutation test, in the *in vivo* rat bone marrow cell chromosome aberration test, and the *in vivo* mouse micronucleus test. Esomeprazole, however, was positive in the *in vitro* human lymphocyte chromosome aberration test. Omeprazole was positive in the *in vitro* human lymphocyte chromosome aberration test, the *in vivo* mouse bone marrow cell chromosome aberration test, and the *in vivo* mouse micronucleus test. The potential effects of esomeprazole on fertility and reproductive performance were assessed using omeprazole studies. Omeprazole at oral doses up to 138 mg/kg/day in rats (about 56 times the human dose on a body surface area basis) was found to have no effect on reproductive performance of parental animals. **Pregnancy: Teratogenic Effects. Pregnancy Category B -** Teratology studies have been performed in rats at oral doses up to 280 mg/kg/day (about 57 times the human dose on a body surface area basis) and in rabbits at oral doses up to 86 mg/kg/day (about 35 times the human dose on a body surface area basis) and have revealed no evidence of impaired fertility or harm to the fetus due to esomeprazole. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed. Teratology studies conducted with omeprazole in rats at oral doses up to 138 mg/kg/day (about 56 times the human dose on a body surface area basis) and in rabbits at doses up to 69 mg/kg/day (about 56 times the human dose on a body surface area basis) did not disclose any evidence for a teratogenic potential of omeprazole. In rabbits, omeprazole in a dose range of 6.9 to 69.1 mg/kg/day (about 5.5 to 56 times the human dose on a body surface area basis) produced dose-related increases in embryo-lethality, fetal resorptions, and pregnancy disruptions. In rats, dose-related embryo/fetal toxicity and postnatal developmental toxicity were observed in offspring resulting from parents treated with omeprazole at 13.8 to 138.0 mg/kg/day (about 5.6 to 56 times the human doses on a body surface area basis). There are no adequate and well-controlled studies in pregnant women. Sporadic reports have been received of congenital abnormalities occurring in infants born to women who have received omeprazole during pregnancy. **Nursing Mothers:** The excretion of esomeprazole in milk has not been studied. However, omeprazole concentrations have been measured in breast milk of a woman following oral administration of 20 mg. Because esomeprazole and omeprazole are likely to be excreted in human milk, and because of the potential for serious adverse reactions in nursing infants from esomeprazole and because of the potential for tumorigenicity shown for omeprazole in rat carcinogenicity studies, a decision should be made to discontinue the drug, taking into account the importance of the drug to the mother. **Pediatric Use:** Safety and effectiveness in pediatric patients have not been established. **Geriatric Use:** Of the total number of patients who received NEXIUM in clinical trials, 778 were 65 to 74 years of age and 124 patients were ≥ 75 years of age. No overall differences in safety and efficacy were observed between the elderly and younger individuals, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out. **ADVERSE REACTIONS** The safety of NEXIUM was evaluated in over 10,000 patients (aged 18-84 years) in clinical trials worldwide including over 7,400 patients in the United States and over 2,600 patients in Europe and Canada. Over 2,900 patients were treated in long-term studies for up to 6-12 months. In general, NEXIUM

was well tolerated in both short- and long-term clinical trials. The safety in the treatment of healing of erosive esophagitis was assessed in four randomized comparative clinical trials, which included 1,240 patients on NEXIUM 20 mg, 2,434 patients on NEXIUM 40 mg, and 3,008 patients on omeprazole 20 mg daily. The most frequently occurring adverse events (≥1%) in all three groups was headache (5.5, 5.0, and 3.8, respectively) and diarrhea (no difference among the three groups). Nausea, flatulence, abdominal pain, constipation, and dry mouth occurred at similar rates among patients taking NEXIUM or omeprazole. Additional adverse events that were reported as possibly or probably related to NEXIUM with an incidence < 1% are listed below by body system: **Body as a Whole:** abdomen enlarged, allergic reaction, asthenia, back pain, chest pain, chest pain substernal, facial edema, peripheral edema, hot flushes, fatigue, fever, flu-like disorder, generalized edema, leg edema, malaise, pain, rigors; **Cardiovascular:** flushing, hypertension, tachycardia; **Endocrine:** goiter; **Gastrointestinal:** bowel irregularity, constipation aggravated, dyspepsia, dysphagia, dysplasia GI, epigastric pain, eructation, esophageal disorder, frequent stools, gastroenteritis, GI hemorrhage, GI symptoms NOS, hiccup, melena, mouth disorder, pharynx disorder, rectal disorder, serum gastrin increased, tongue disorder, tongue edema, ulcerative stomatitis, vomiting; **Hearing:** earache, tinnitus; **Hematologic:** anemia, anemia hypochromic, cervical lymphadenopathy, epistaxis, leukocytosis, leukopenia, thrombocytopenia; **Hepatic:** bilirubinemia, hepatic function abnormal, SGOT increased, SGPT increased; **Metabolic/Nutritional:** glycosuria, hyperuricemia, hyponatremia, increased alkaline phosphatase, thirst, vitamin B12 deficiency, weight increase, weight decrease; **Musculoskeletal:** arthralgia, arthritis aggravated, arthropathy, cramps, fibromyalgia syndrome, hernia, polymyalgia rheumatica; **Nervous System/Psychiatric:** anorexia, apathy, appetite increased, confusion, depression aggravated, dizziness, hypertonia, nervousness, hypoesthesia, impotence, insomnia, migraine, migraine aggravated, paresthesia, sleep disorder, somnolence, tremor, vertigo, visual field defect; **Reproductive:** dysmenorrhea, menstrual disorder, vaginitis; **Respiratory:** asthma aggravated, coughing, dyspnea, larynx edema, pharyngitis, rhinitis, sinusitis; **Skin and Appendages:** acne, angioedema, dermatitis, pruritus, pruritus ani, rash, rash erythematous, rash maculo-papular, skin inflammation, sweating increased, urticaria; **Special Senses:** otitis media, parosmia, taste loss, taste perversion; **Urogenital:** abnormal urine, albuminuria, cystitis, dysuria, fungal infection, hematuria, micturition frequency, moniliasis, genital moniliasis, polyuria; **Visual:** conjunctivitis, vision abnormal. Endoscopic findings that were reported as adverse events include: duodenitis, esophagitis, esophageal stricture, esophageal ulceration, esophageal varices, gastric ulcer, gastritis, hernia, benign polyps or nodules, Barrett's esophagus, and mucosal discoloration. Other adverse events not observed with NEXIUM, but occurring with omeprazole can be found in the omeprazole package insert. **OVERDOSAGE** A single oral dose of esomeprazole at 510 mg/kg (about 103 times the human dose on a body surface area basis) was lethal to rats. The major signs of acute toxicity were reduced motor activity, changes in respiratory frequency, tremor, ataxia, and intermittent clonic convulsions. There have been no reports of overdose with esomeprazole. Reports have been received of overdose with omeprazole in humans. Doses ranged up to 2,400 mg (120 times the usual recommended clinical dose). Manifestations were variable, but included confusion, drowsiness, blurred vision, tachycardia, nausea, diaphoresis, flushing, headache, dry mouth, and other adverse reactions similar to those seen in normal clinical experience (see omeprazole package insert-**ADVERSE REACTIONS**). No specific antidote for esomeprazole is known. Since esomeprazole is extensively protein bound, it is not expected to be removed by dialysis. In the event of overdose, treatment should be symptomatic and supportive. As with the management of any overdose, the possibility of multiple drug ingestion should be considered. For current information on treatment of any drug overdose, a certified Regional Poison Control Center should be contacted. Telephone numbers are listed in the Physicians' Desk Reference (PDR) or local telephone book.

NEXIUM is a trademark of the AstraZeneca group of companies.
©AstraZeneca 2001. All rights reserved.

Prilosec® (omeprazole)

20-MG Delayed-Release Capsules

BRIEF SUMMARY Before prescribing PRILOSEC, please see full Prescribing Information.

INDICATIONS AND USAGE Erosive Esophagitis: PRILOSEC Delayed-Release Capsules are indicated for the short-term treatment (4-8 weeks) in the healing of erosive esophagitis, which has been diagnosed by endoscopy. **CONTRAINDICATIONS Omeprazole** PRILOSEC Delayed-Release Capsules are contraindicated in patients with known hypersensitivity to any component of the formulation. **PRECAUTIONS** Symptomatic response to therapy with omeprazole does not preclude the presence of gastric malignancy. Atrophic gastritis has been noted occasionally in gastric corpus biopsies from patients treated long-term with omeprazole. **Information for Patients:** PRILOSEC Delayed-Release Capsules should be taken before eating and should not be opened, chewed or crushed, and should be swallowed whole. **DRUG INTERACTIONS** Other Omeprazole can prolong the elimination of diazepam, warfarin and phenytoin, drugs that are metabolized by oxidation in the liver. Although in normal subjects no interaction with theophylline or propranolol was found, there have been clinical reports of interaction with other drugs metabolized via the cytochrome P-450 system (eg, cyclosporine, disulfiram, and benzodiazepines). Patients should be monitored to determine if it is necessary to adjust the dosage of these drugs when taken concomitantly with PRILOSEC. Omeprazole inhibits gastric acid secretion, therefore, it is theoretically possible that omeprazole may interfere with absorption of drugs where gastric pH is an important determinant of their bioavailability (eg, ketoconazole, ampicillin esters, digoxin, and iron salts). In clinical trials, antacids were used concomitantly with the administration of PRILOSEC. **Carcinogenesis, Mutagenesis, Impairment of Fertility:** In two 24-month carcinogenicity studies in rats, omeprazole at daily doses of 1.7, 3.4, 13.8, 44.0 and 140.8 mg/kg/day (approximately 4 to 352 times the human dose, based on a patient weight of 50 kg and a human dose of 20 mg) produced gastric ECL cell carcinoids in a dose-related manner in both male and female rats; the incidence of this effect was markedly higher in female rats, which had higher blood levels of omeprazole. Gastric carcinoids seldom occur in the untreated rat. In addition, ECL cell hyperplasia was present in all treated groups of both sexes. In one of these studies, female rats were treated with 13.8 mg omeprazole/kg/day (approximately 35 times the human dose) for one year, then followed for an additional year without the drug. No carcinoids were seen in these rats. An increased incidence of treatment-related ECL cell hyperplasia was observed at the end of one year (94% treated vs 10% controls). By the second year the difference between treated and control rats was much smaller (46% vs 26%) but still showed more hyperplasia in the treated group. An unusual primary malignant tumor in the stomach was seen in one rat (2%). No similar tumor was seen in male or female rats treated for two years. For this strain of rat no similar tumor has been noted historically, but a finding involving only one tumor is difficult to interpret. A 78-week mouse carcinogenicity study of omeprazole did not show increased tumor occurrence, but the study was not conclusive. Omeprazole was not mutagenic in an *in vitro*

Ames *Salmonella typhimurium* assay, an *in vitro* mouse lymphoma cell assay and an *in vivo* rat liver DNA damage assay. A mouse micronucleus test at 625 and 6250 times the human dose gave a borderline result, as did an *in vivo* bone marrow chromosome aberration test. A second mouse micronucleus study at 2000 times the human dose, but with different (suboptimal) sampling times, was negative. In a rat fertility and general reproductive performance test, omeprazole in a dose range of 13.8 to 138.0 mg/kg/day (approximately 35 to 345 times the human dose) was not toxic or deleterious to the reproductive performance of parental animals. **Pregnancy:** Category C - Teratology studies conducted in pregnant rats at doses up to 138 mg/kg/day (approximately 345 times the human dose) and in pregnant rabbits at doses up to 69 mg/kg/day (approximately 172 times the human dose) did not disclose any evidence for a teratogenic potential of omeprazole. In rabbits, omeprazole in a dose range of 6.9 to 69.1 mg/kg/day (approximately 17 to 172 times the human dose) produced dose-related increases in embryo-lethality, fetal resorptions and pregnancy disruptions. In rats, dose-related embryo/fetal toxicity and postnatal developmental toxicity were observed in offspring resulting from parents treated with omeprazole 13.8 to 138.0 mg/kg/day (approximately 35 to 345 times the human dose). There are no adequate or well-controlled studies in pregnant women. Sporadic reports have been received of congenital abnormalities occurring in infants born to women who have received omeprazole during pregnancy. Omeprazole should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Nursing Mothers:** It is not known whether omeprazole is excreted in human milk. In rats, omeprazole administration during late gestation and lactation at doses of 13.8 to 138 mg/kg/day (35 to 345 times the human dose) resulted in decreased weight gain in pups. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from omeprazole, and because of the potential for tumorigenicity shown for omeprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother. **Pediatric Use:** Safety and effectiveness in pediatric patients have not been established. **Geriatric Use:** No overall differences in safety and efficacy were observed between the elderly and younger individuals, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out. **ADVERSE REACTIONS** In the U.S. clinical trial population of 465 patients (including duodenal ulcer, Zollinger-Ellison syndrome and resistant ulcer patients), the following adverse experiences were reported to occur in 1% or more of patients on therapy with PRILOSEC. Numbers in parentheses indicate percentages of the adverse experiences considered by investigators as possibly, probably or definitely related to the drug:

	Omeprazole (n=465)	Placebo (n=64)	Ranitidine (n=195)
Headache	6.9 (2.4)	6.3	7.7 (2.6)
Diarrhea	3.0 (1.9)	3.1 (1.6)	2.1 (0.5)
Abdominal Pain	2.4 (0.4)	3.1	2.1
Nausea	2.2 (0.9)	3.1	4.1 (0.5)
URI	1.9	1.6	2.6
Dizziness	1.5 (0.6)	0.0	2.6 (1.0)
Vomiting	1.5 (0.4)	4.7	1.5 (0.5)
Rash	1.5 (1.1)	0.0	0.0
Constipation	1.1 (0.9)	0.0	0.0
Cough	1.1	0.0	1.5
Asthenia	1.1 (0.2)	1.6 (1.6)	1.5 (1.0)
Back Pain	1.1	0.0	0.5

The following adverse reactions which occurred in 1% or more of omeprazole-treated patients have been reported in international double-blind, and open-label, clinical trials in which 2,631 patients and subjects received omeprazole and 120 patients took a placebo. A causal relationship was not assessed. The percentages are given omeprazole then placebo, respectively. **Body as a Whole, site unspecified:** Abdominal Pain 5.2% and 3.3%; Asthenia 1.3% and 0.8%. **Digestive System:** Constipation 1.5 and 0.8; Diarrhea 3.7 and 2.5; Flatulence 2.7 and 5.8; Nausea 4.0 and 6.7; Vomiting 3.2 and 10.0; Acid regurgitation 1.9 and 3.3. **Nervous System/Psychiatric:** Headache 2.9 and 2.5. Additional adverse experiences occurring in < 1% of patients or subjects in domestic and/or international trials, or occurring since the drug was marketed, are shown below within each body system. In many instances, the relationship to PRILOSEC was unclear. **Body As a Whole:** Allergic reactions, including, rarely, anaphylaxis (see also *Skin* below), fever, pain, fatigue, malaise, abdominal swelling. **Cardiovascular:** Chest pain or angina, tachycardia, bradycardia, palpitation, elevated blood pressure, peripheral edema. **Gastrointestinal:** Pancreatitis (some fatal), anorexia, irritable colon, flatulence, fecal discoloration, esophageal candidiasis, mucosal atrophy of the tongue, dry mouth. During treatment with omeprazole, gastric fundic gland polyps have been noted rarely. These polyps are benign and appear to be reversible when treatment is discontinued. Gastrointestinal carcinoids have been reported in patients with ZE syndrome on long-term treatment with PRILOSEC. This finding is believed to be a manifestation of the underlying condition, which is known to be associated with such tumors. **Hepatic:** Mild and, rarely, marked elevations of liver function tests [ALT (SGPT), AST (SGOT), γ -glutamyl transpeptidase, alkaline phosphatase, and bilirubin (jaundice)]. In rare instances, overt liver disease has occurred, including hepatocellular, cholestatic, or mixed hepatitis, liver necrosis (some fatal), hepatic failure (some fatal), and hepatic encephalopathy. **Metabolic/Nutritional:** Hyponatremia, hypoglycemia, weight gain. **Musculoskeletal:** Muscle cramps, myalgia, muscle weakness, joint pain, leg pain. **Nervous System/Psychiatric:** Psychic disturbances including depression, aggression, hallucinations, confusion, insomnia, nervousness, tremors, apathy, somnolence, anxiety, dream abnormalities; vertigo; paresthesia; hemifacial dysesthesia. **Respiratory:** Epistaxis, pharyngeal pain. **Skin:** Rash and, rarely, cases of severe generalized skin reactions including toxic epidermal necrolysis (TEN; some fatal), Stevens-Johnson syndrome, and erythema multiforme (some severe); purpura and/or petechiae (some with rechallenge); skin inflammation, urticaria, angioedema, pruritus, alopecia, dry skin, hyperhidrosis. **Special Senses:** Tinnitus, taste perversion. **Urogenital:** Interstitial nephritis (some with positive rechallenge), urinary tract infection, microscopic pyuria, urinary frequency, elevated serum creatinine, proteinuria, hematuria, glycosuria, testicular pain, gynecomastia. **Hematologic:** Rare instances of pancytopenia, agranulocytosis (some fatal), thrombocytopenia, neutropenia, anemia, leucocytosis, and hemolytic anemia have been reported. **OVERDOSAGE** Rare reports have been received of overdose with omeprazole. Doses ranged from 320 mg to 900 mg (16-45 times the usual recommended clinical dose). Manifestations were variable, but included confusion, drowsiness, blurred vision, tachycardia, nausea, diaphoresis, flushing, headache, and dry mouth. Symptoms were transient, and no serious clinical outcome has been reported. No specific antidote for omeprazole overdose is known. Omeprazole is extensively protein bound and is, therefore, not readily dialyzable. In the event of overdose, treatment should be symptomatic and supportive.

PRILOSEC is a registered trademark of the AstraZeneca group of companies.

© AstraZeneca 2001. All rights reserved.

202389 4/01

AstraZeneca 

NOTE: This summary provides important information about NEXIUM and PRILOSEC. If you would like more information, ask your doctor or pharmacist to let you read the professional labeling and then discuss it with them.

ADVERTISEMENT

advertiser.connections

Get more information from our advertising partners about the products and services they advertise in National Geographic magazine. Remember, our advertisers help make possible the Society's mission of education, exploration and research. To find out more, point and click to the following URLs:

American Plastics Council

www.plastics.org

AstraZeneca Nexium

www.purplepill.com

Avandia www.avandia.com

Canon www.canon.com

Celebrex www.celebrex.com

Chevrolet Suburban

www.chevrolet.com/suburban

Chrysler Town & Country

www.chrysler.com

Encompass Insurance

www.encompassinsurance.com

Ford Explorer www.fordoutfitters.com

Ford Motor Company www.ford.com

General Mills Cheerios

www.cheerios.com

Honda www.honda.com

Jennair www.jennair.com

Kodak www.kodak.com

MasterCard www.mastercard.com

Merrill Lynch www.askmerrill.com

Mercury Mountaineer

www.2002mountaineer.com

Microsoft www.microsoft.com/office

Nature Valley Granola Bars

www.GeneralMills.com/NatureValley

Nikon www.nikonnet.com

Prevacid www.prevacid.com

State Farm www.statefarm.com

State Farm Mutual Funds

www.statefarm.com/mutual

Taster's Choice

www.tasterschoice.com

Toyota 4-Runner www.toyota.com

Toyota Corporate

www.toyota.com/tomorrow

For more information regarding National Geographic Society products, mission-related programs and membership to the National Geographic Society, log onto www.nationalgeographic.com.



HARALD SCHUTZ

■ NGS RESEARCH GRANT

Diverse Madagascar

In a neon coat of many colors a *Furcifer* chameleon shows off its wild hues. Madagascar has upwards of 60 recognized chameleon species—more than two-thirds of the world's total. For 13 years biologist Steve Goodman of Chicago's Field Museum and the World Wide Fund for Nature has been studying Madagascar's extraordinary biodiversity. He and his colleagues have discovered a number of new species, including birds, rodents, insectivores, and several primates.

TECHNOLOGY

Flaky Problem

Not much is quieter than falling snow—but fish might disagree. New research shows that as each snowflake hits water, it traps a bubble of air just beneath the surface. The vibrating bubble emits a screech in the range of 50 to 200 kilohertz, which is inaudible to humans but akin to rain on a metal roof for certain sea life. Snow sound hinders sonar scans used for fish-migration studies. Now scientists can work around the snowstorms—or at least filter out the racket they make.



ART BY ALICIA BUELOW



MARK CHILVERS, INDEPENDENT, LONDON

COMMUNITIES

Electrifying News

A Scottish isle powers up

The entire student body (above) of the schoolhouse on Canna—a tiny, windswept island in Scotland's Hebridean chain—can now participate in a true current event. Last summer two new generators were installed by Scotland's National Trust to give the island electricity 24 hours a day. Prior to the generators' arrival older diesel engines provided power—but only for a few hours each day. Now a household can run more than one appliance at a time, a fact that residents hope will attract new settlers to the five-mile-long island, which has a population of 13.

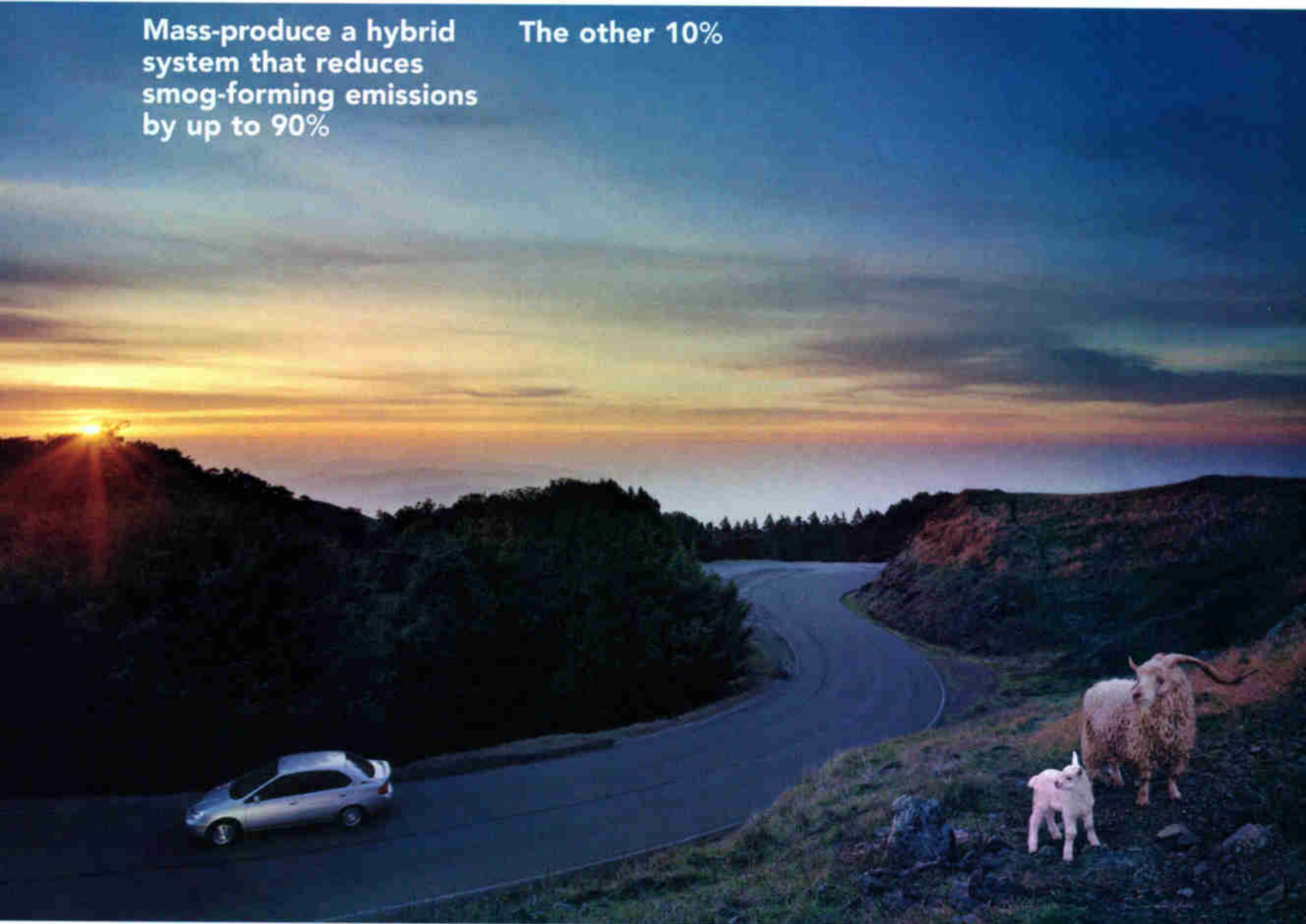
TODAY

Mass-produce a hybrid system that reduces smog-forming emissions by up to 90%

TOMORROW

The other 10%

TOYOTA



In 1997, Toyota was the first car company to mass-produce a hybrid vehicle. By combining gasoline and electric power, the Prius reduces smog-forming emissions* and cuts gas consumption in half. In short, it has revolutionized the way cars affect our environment.

The next step? A hydrogen-powered fuel cell vehicle whose only emission is pure water. Beyond that, who knows? But no matter what, fresh alternatives won't be found overnight. They'll be the result of 90% perspiration. And 10% inspiration.

www.toyota.com/tomorrow

ENVIRONMENT

Tribal Accord a Win-Win-Win

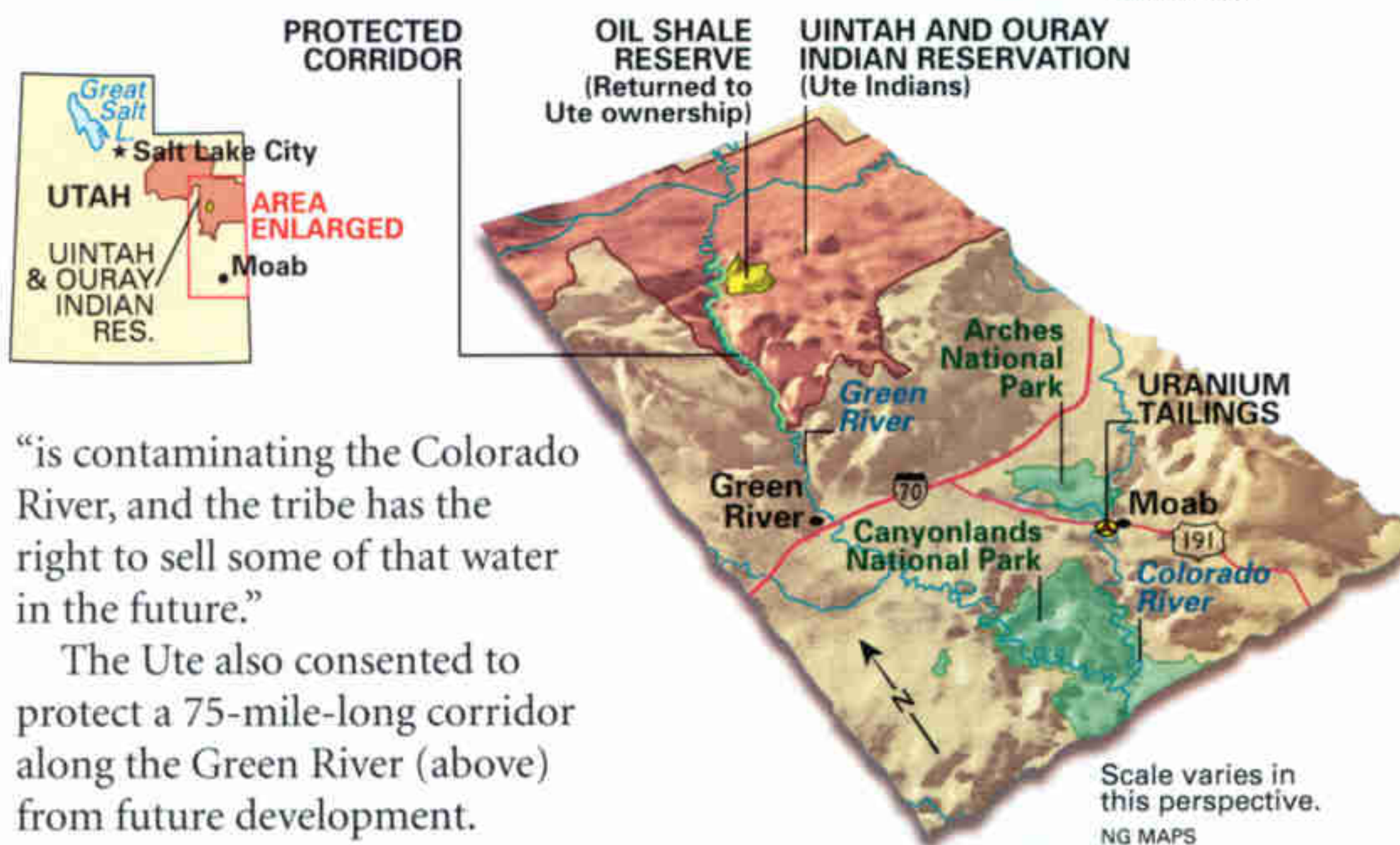
*Ute's land returned,
environment to benefit*

Redressing one wrong may yield three rights. In one of the largest land returns in American history, the U.S. government has restored some 80,000 acres in Utah to the Ute Indian Tribe. Rich in oil shale, the land was allotted to the tribe in 1882 but was taken back in 1916 for a military fuel reserve.

Under the new agreement 9 percent of oil and gas royalties will go to help clean up a 110-foot-tall pile of uranium tailings 40 miles south of Ute land near Arches and Canyonlands National Parks. The site, says Ute attorney Rob Thompson,



CARR CLIFTON



“is contaminating the Colorado River, and the tribe has the right to sell some of that water in the future.”

The Ute also consented to protect a 75-mile-long corridor along the Green River (above) from future development.

CONSERVATION

New Sanctuary in the Amazon

Bristled birds called hoatzins are among the stars of Brazil's most recently protected ecosystem. Spreading over almost 9,000 square miles, Amanã Reserve was created to link Mamirauá Reserve and Jaú National Park, resulting in more than 22,000 square miles of protected habitat—an area larger than Costa Rica. The goal: to preserve habitat while allowing subsistence hunting and fishing by local people.



LUIS CLAUDIO MARIGO

I want to share in her happiness

©2001 American Plastics Council. All rights reserved.

Sometimes I wonder which one of us has more wisdom and which one has more joy. And we both thank plastic. Because it's more than a toy:

It's in my hip replacement and my hearing aid, so I can help her see that nothing will hold me back.

With a little help, we can share this happiness for years to come.

How have plastics touched your life?



Plastics make it possible.
www.plastics.org

MARINE BIOLOGY

Sea Stars With an Appetite

Crown of thorns invading Red Sea coral reefs



ZIGGY LIVNAT

CHEMISTRY

More Bubbly?

Champagne critics in France judge the sparkling wine by its bubbles, among other qualities. (The smaller the better, they say.) French scientists who study fizz have long known that bubbles form along dust or tiny nicks on the walls of glasses. Now they've discovered a protein coating on the bubbles that may hold the key to achieving the perfect petite bubble.



NGS PHOTOGRAPHER MARK THIESSEN

Like underwater tanks armored with spikes, crown-of-thorns sea stars can spell doom for coral reefs. Known in Australian waters since the 1960s, the crown of thorns has expanded into much of the Pacific and Indian Oceans and threatens reefs in the Red Sea, where divers have removed

thousands of the sea stars from one area under attack.

One crown of thorns can devour 140 square feet of coral in a single year. Though a natural part of reef ecosystems, the sea stars can cause extensive damage because, for reasons not fully understood, a small group can suddenly multiply to millions.



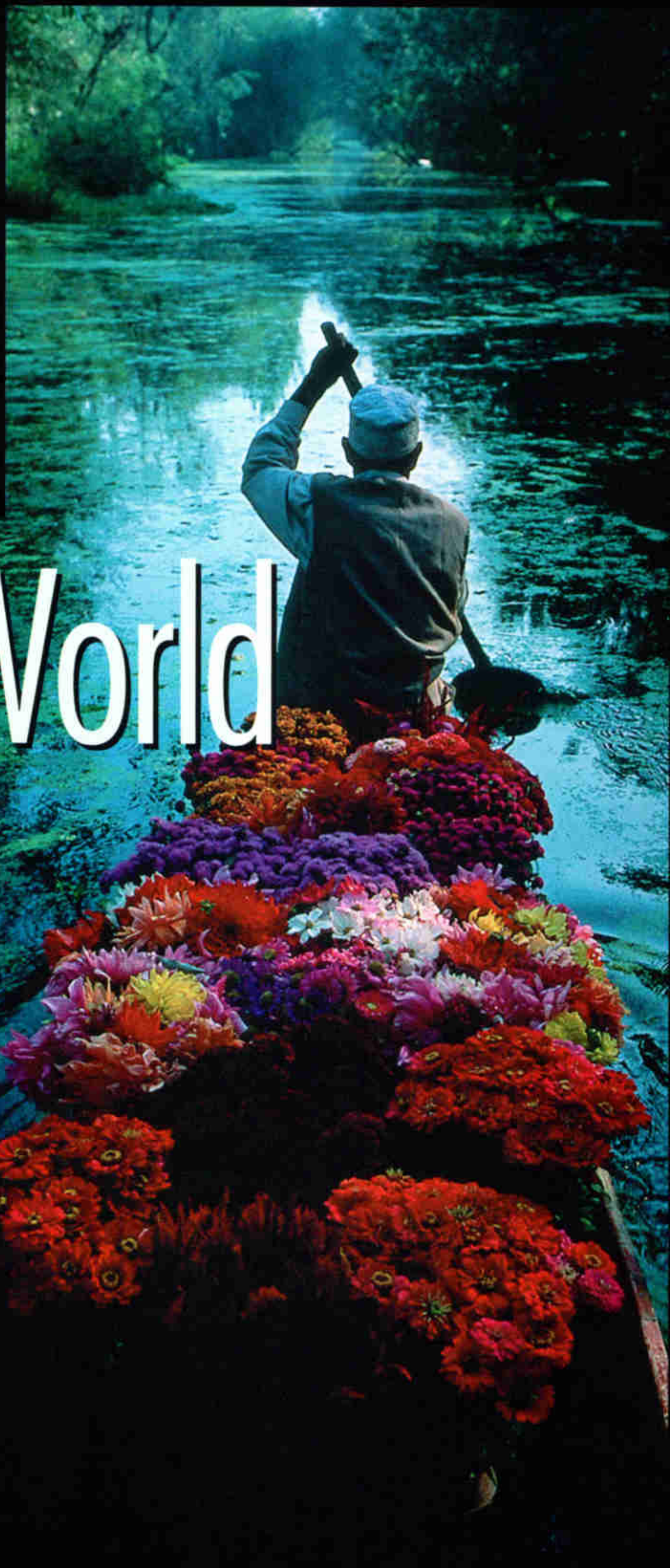
PETER ESSICK

CONSERVATION

Undamming the Kissimmee

Engineers put the kinks back into an abused river

With the roar of bulldozers the tide turned for Florida's Kissimmee River earlier this year when workers removed the last of a dam-like structure, part of a 1960s effort to straighten the stream for flood control. That U.S. Army Corps of Engineers project shackled the river's natural flow and destroyed more than 30,000 acres of wetlands. A half-billion-dollar, ten-year restoration is diverting 43 miles of the river back into its original bed.



Wired World

Experience our world—and more—in incredible new ways. Interactive tools equip you—as only the Web can—to plan your next travel adventure, investigate remote locations in vivid detail, and watch live events as they unfold. Listen to dispatches from the field, participate in forums, and experience wild animal cams with just the click of a mouse.

- Stay informed with daily news from around the globe
- Purchase books, CD-ROMs, videos, and more from our online store
- Plan your next vacation and get trusted advice from the Trip Finder
- Create customized views of the world with our Map Machine

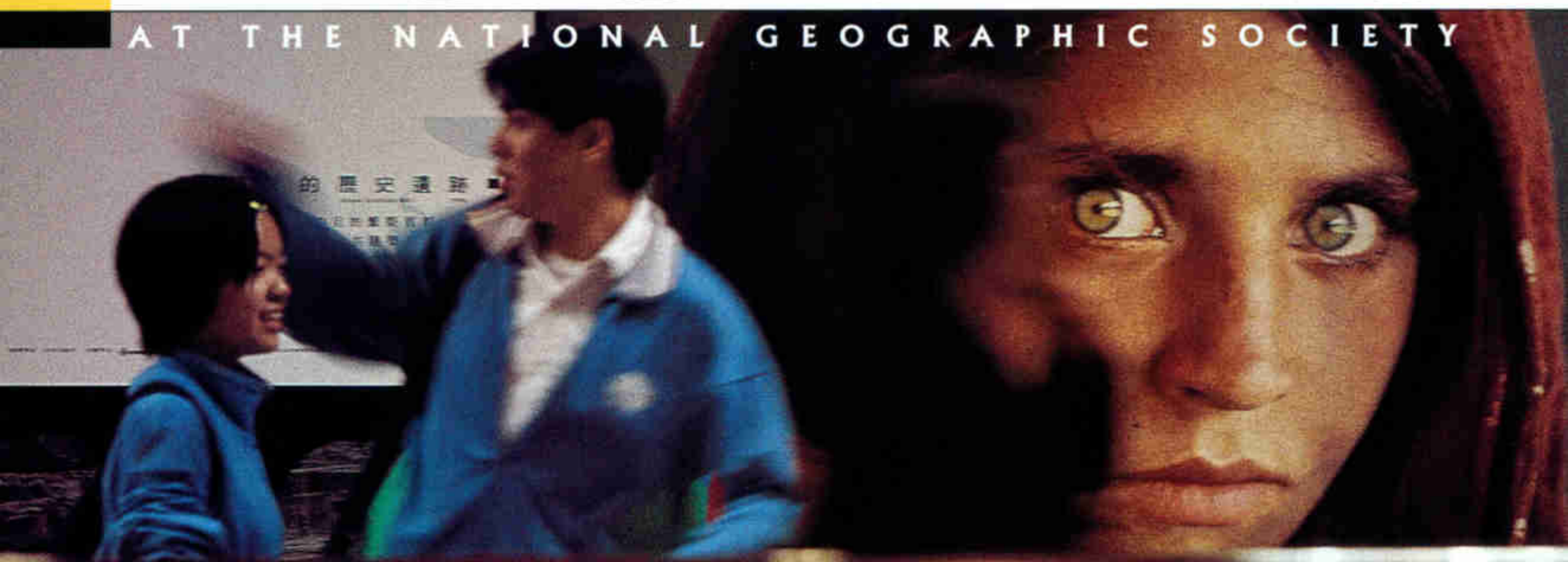
nationalgeographic.com

 NATIONAL
GEOGRAPHIC
.COM

Join the Adventure

Behind the SCENES

AT THE NATIONAL GEOGRAPHIC SOCIETY



Outward Bound

Subway show launches Taiwan edition

Familiar photographs from four pages graced Taiwan's subway stations as we launched our local-language edition there late last year. More than 100,000 passengers

daily saw such images as Steve McCurry's haunting portrait of an Afghan refugee (above). Since the Chinese-language launch in Taiwan, we've started editions in Finland, Portugal,

and Turkey, and our 20th local-language edition will begin publishing in Thailand next month. One in five readers of the magazine now reads it in a language other than English.

CHIEN-CHI CHANG

Trade Places

Clues to Aksum's past

In a tomb on a hill called Bieta Giyorgis near the Ethiopian town of Aksum (page 110), Kathryn Bard holds a piece of an amphora dating from the second century A.D. "It has a stamped inscription in Latin, which is very unusual," says the Boston University archaeologist, whose work on Bieta Giyorgis has been funded by our Committee on Research and Exploration since 1995. In 1998 Bard received one of the committee's chairman's awards.

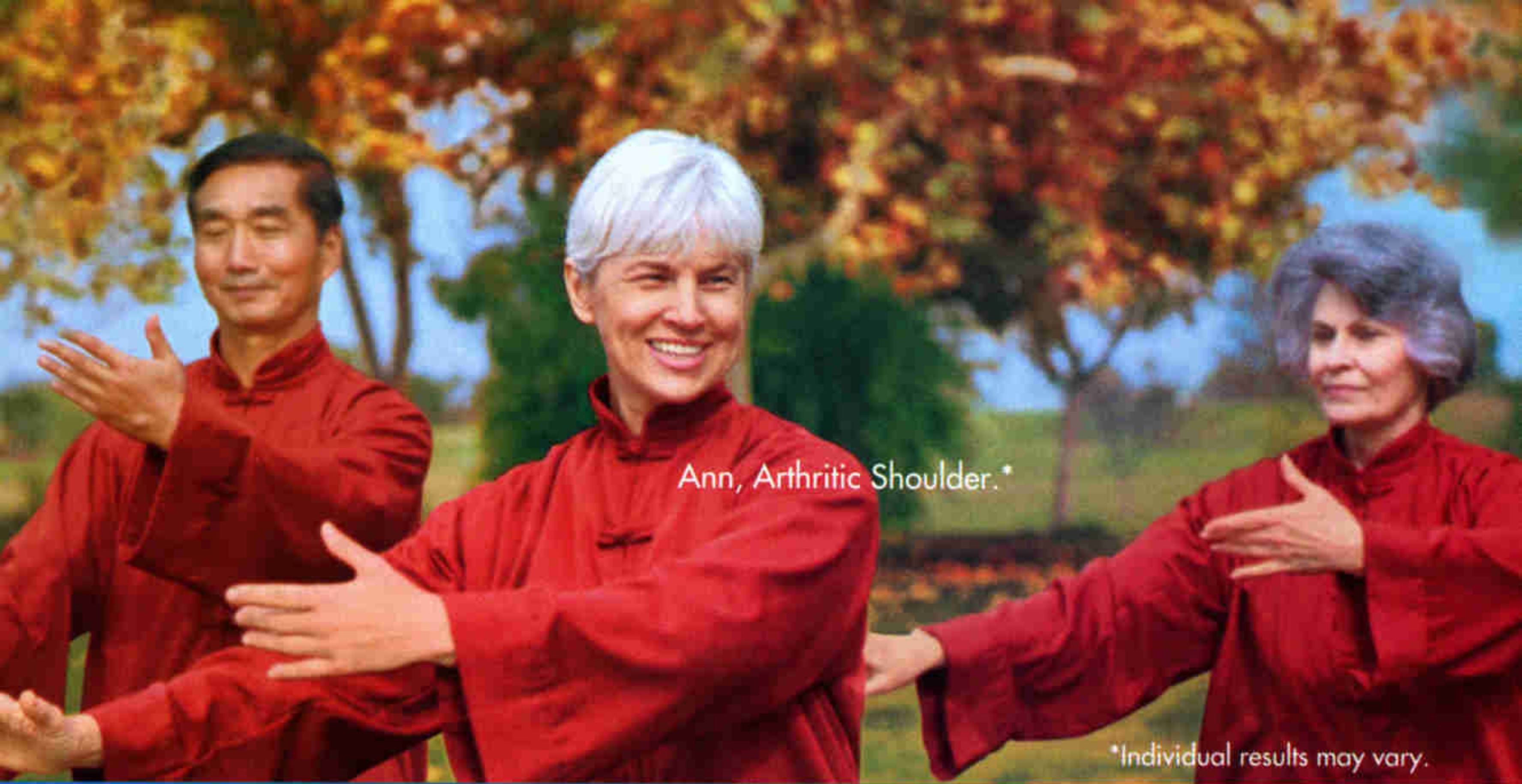
The inscription "helps us identify it as a wine jar from

southern France and tells us that high-status goods were making their way to Aksum when the kingdom was a major trading partner of the Roman Empire," Bard says. "Aksum supplied raw

materials, such as elephant ivory and incense, which were highly desired elsewhere. The Romans had a trade network from the Mediterranean to India via the Red Sea, and this was part of it."



GEORGE STEINMETZ



Ann, Arthritic Shoulder.*

*Individual results may vary.

Celebrate

Arthritis Pain Relief.

Celebrex. The #1 selling prescription arthritis medicine.†

Celebrex. The first arthritis medicine that targets only the COX-2 enzyme.

Celebrex. Powerful 24-hour relief from osteoarthritis pain and stiffness.

Important Celebrex Information. Celebrex should not be taken in late pregnancy or if you've had aspirin-sensitive asthma or allergic reactions to aspirin or other arthritis medicines or certain drugs called sulfonamides. In rare cases serious stomach problems such as bleeding can occur without warning. The most common side effects in clinical trials were indigestion, diarrhea and abdominal pain. Tell your doctor if you have kidney or liver problems. For more information call 1-888-Celebrex or visit www.celebrex.com.

Ask Your Doctor If Celebrex Is Right For You.

CELEBREX[®]
(CELECOXIB CAPSULES) 100 mg
200 mg

Please see important product information on adjacent page.

† IMS National Prescription Audit 10/1/99-9/31/00
© 2001 Searle, a division of Pharmacia UJ0009961.01

PHARMACIA 

BRIEF SUMMARY—CELEBREX® (celecoxib capsules)

Before prescribing, please consult complete prescribing information.

INDICATIONS AND USAGE

For relief of the signs and symptoms of OA, and of RA in adults.

CONTRAINDICATIONS

CELEBREX is contraindicated in patients with known hypersensitivity to celecoxib. CELEBREX should not be given to patients who have demonstrated allergic-type reactions to sulfonamides. CELEBREX should not be given to patients who have experienced asthma, urticaria, or allergic-type reactions after taking aspirin or other NSAIDs. Severe, rarely fatal, anaphylactoid-like reactions to NSAIDs have been reported in such patients (see WARNINGS — Anaphylactoid Reactions, and PRECAUTIONS — Preexisting Asthma).

WARNINGS

Gastrointestinal (GI) Effects — Risk of GI Ulceration, Bleeding, and Perforation: Serious GI toxicity such as bleeding, ulceration, and perforation of the stomach, small intestine or large intestine, can occur at any time, with or without warning symptoms, in patients treated with NSAIDs. Minor upper GI problems, such as dyspepsia, are common and may also occur at any time during NSAID therapy. Therefore, physicians and patients should remain alert for ulceration and bleeding, even in the absence of previous GI tract symptoms. Patients should be informed about the signs and/or symptoms of serious GI toxicity and the steps to take if they occur. Only 1/5 patients who develop a serious upper GI adverse event on NSAID therapy is symptomatic. Upper GI ulcers, gross bleeding or perforation, caused by NSAIDs, appear to occur in approximately 1% of patients treated for 3–6 months, and in about 2–4% of patients treated for one year. These trends continue thus, increasing the likelihood of developing a serious GI event at some time during the course of therapy. However, even short-term therapy is not without risk. It is unclear, at the present time, how the above rates apply to CELEBREX (see CLINICAL STUDIES — Special Studies in the complete prescribing information). Among 5,285 patients who received CELEBREX in controlled clinical trials of 1 to 6 months duration (most were 3 month studies) at a daily dose of 200 mg or more, 2 (0.04%) experienced significant upper GI bleeding, at 14 and 22 days after initiation of dosing. Approximately 40% of these 5,285 patients were in studies that required them to be free of ulcers by endoscopy at study entry. Thus it is unclear if this study population is representative of the general population. Prospective, long-term studies required to compare the incidence of serious, clinically significant upper GI adverse events in patients taking CELEBREX vs. comparator NSAID products have not been performed. NSAIDs should be prescribed with extreme caution in patients with a prior history of ulcer disease or GI bleeding. Most spontaneous reports of fatal GI events are in elderly or debilitated patients and therefore special care should be taken in treating this population. **To minimize the potential risk for an adverse GI event, the lowest effective dose should be used for the shortest possible duration.** For high risk patients, alternate therapies that do not involve NSAIDs should be considered. Studies have shown that patients with a prior history of peptic ulcer disease and/or GI bleeding and who use NSAIDs, have a greater than 10-fold higher risk for developing a GI bleed than patients with neither of these risk factors. In addition to a past history of ulcer disease, pharmacoepidemiological studies have identified several other co-therapies or co-morbid conditions that may increase the risk for GI bleeding such as: treatment with oral corticosteroids, treatment with anticoagulants, longer duration of NSAID therapy, smoking, alcoholism, older age, and poor general health status.

Anaphylactoid Reactions: As with NSAIDs in general, anaphylactoid reactions have occurred in patients without known prior exposure to CELEBREX. In post-marketing experience, rare cases of anaphylactic reactions and angioedema have been reported in patients receiving CELEBREX. CELEBREX should not be given to patients with the aspirin triad. This symptom complex typically occurs in asthmatic patients who experience rhinitis with or without nasal polyps, or who exhibit severe, potentially fatal bronchospasm after taking aspirin or other NSAIDs (see CONTRAINDICATIONS and PRECAUTIONS — Preexisting Asthma). Emergency help should be sought in cases where an anaphylactoid reaction occurs.

Advanced Renal Disease: Treatment with CELEBREX is not recommended.

Pregnancy: In late pregnancy CELEBREX should be avoided because it may cause premature closure of the ductus arteriosus.

PRECAUTIONS

General: CELEBREX cannot be expected to substitute for corticosteroids or to treat corticosteroid insufficiency. The pharmacological activity of CELEBREX in reducing inflammation, and possibly fever, may diminish the utility of these diagnostic signs in detecting infectious complications of presumed noninfectious, painful conditions.

Hepatic Effects: Borderline elevations of one or more liver tests may occur in up to 15% of patients taking NSAIDs, and notable elevations of ALT or AST (approximately three or more times the upper limit of normal) have been reported in approximately 1% of patients in clinical trials with NSAIDs. These laboratory abnormalities may progress, may remain unchanged, or may be transient with continuing therapy. Rare cases of severe hepatic reactions, including jaundice and fatal fulminant hepatitis, liver necrosis and hepatic failure (some with fatal outcome) have been reported with NSAIDs, including CELEBREX. (See ADVERSE REACTIONS — post-marketing experience.) In controlled clinical trials of CELEBREX, the incidence of borderline elevations of liver tests was 6% for CELEBREX and 5% for placebo, and approximately 0.2% of patients taking CELEBREX and 0.3% of patients taking placebo had notable elevations of ALT and AST. A patient with symptoms and/or signs suggesting liver dysfunction, or in whom an abnormal liver test has occurred, should be monitored carefully for evidence of the development of a more severe hepatic reaction while on therapy with CELEBREX. If clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur (e.g., eosinophilia, rash, etc.), CELEBREX should be discontinued.

Renal Effects: Long-term administration of NSAIDs has resulted in renal papillary necrosis and other renal injury. Renal toxicity has also been seen in patients in whom renal prostaglandins have a compensatory role in the maintenance of renal perfusion. In these patients, administration of an NSAID may cause a dose-dependent reduction in prostaglandin formation and, secondarily, in renal blood flow, which may precipitate overt renal decompensation. Patients at greatest risk of this reaction are those with impaired renal function, heart failure, or liver dysfunction, those taking diuretics and ACE inhibitors, and the elderly. Discontinuation of NSAID therapy is usually followed by recovery to the pretreatment state. Clinical trials with CELEBREX have shown renal effects similar to those observed with comparator NSAIDs. Caution should be used when initiating treatment with CELEBREX in patients with considerable dehydration. It is advisable to rehydrate

patients first and then start therapy with CELEBREX. Caution is also recommended in patients with pre-existing kidney disease (see WARNINGS — Advanced Renal Disease).

Hematological Effects: Anemia may occur. In controlled clinical trials the incidence of anemia was 0.6% with CELEBREX and 0.4% with placebo. Patients on long-term treatment with CELEBREX should have their hemoglobin or hematocrit checked if they exhibit any signs or symptoms of anemia or blood loss. CELEBREX does not generally affect platelet counts, prothrombin time (PT), or partial thromboplastin time (PTT), and does not appear to inhibit platelet aggregation at indicated dosages (See CLINICAL STUDIES — Special Studies — Platelets in the complete prescribing information).

Fluid Retention and Edema: Fluid retention and edema may occur (see ADVERSE REACTIONS). Therefore, CELEBREX should be used with caution in patients with fluid retention, hypertension, or heart failure.

Preexisting Asthma: Do not use in patients with aspirin-sensitive asthma because of the risk of severe bronchospasm. Use with caution in patients with preexisting asthma.

Laboratory Tests: Because serious GI tract ulcerations and bleeding can occur without warning symptoms, physicians should monitor for signs or symptoms of GI bleeding. During the controlled clinical trials, there was an increased incidence of hyperchloremia in patients receiving celecoxib compared with patients on placebo. Other laboratory abnormalities that occurred more frequently in the patients receiving celecoxib included hypophosphatemia, and elevated BUN. These laboratory abnormalities were also seen in patients who received comparator NSAIDs in these studies. The clinical significance of these abnormalities has not been established.

Drug Interactions: General: Celecoxib metabolism is predominantly mediated via cytochrome P450 2C9 in the liver. Co-administration of celecoxib with drugs that are known to inhibit 2C9 should be done with caution. *In vitro* studies indicate that celecoxib, although not a substrate, is an inhibitor of cytochrome P450 2D6. Therefore, there is a potential for an *in vivo* drug interaction with drugs that are metabolized by P450 2D6. **ACE-inhibitors:** Reports suggest that NSAIDs may diminish the antihypertensive effect of Angiotensin Converting Enzyme (ACE) inhibitors. This interaction should be given consideration in patients taking CELEBREX concomitantly with ACE-inhibitors. **Furosemide:** Clinical studies, as well as post marketing observations, have shown that NSAIDs can reduce the natriuretic effect of furosemide and thiazides in some patients. This response has been attributed to inhibition of renal prostaglandin synthesis. **Aspirin:** CELEBREX can be used with low dose aspirin. However, concomitant administration of aspirin with CELEBREX may result in an increased rate of GI ulceration or other complications, compared to use of CELEBREX alone (see CLINICAL STUDIES — Special Studies — Gastrointestinal in the complete prescribing information). Because of its lack of platelet effects, CELEBREX is not a substitute for aspirin for cardiovascular prophylaxis. **Fluconazole:** Concomitant administration of fluconazole at 200 mg QD resulted in a two-fold increase in celecoxib plasma concentration. This increase is due to the inhibition of celecoxib metabolism via P450 2C9 by fluconazole (see Pharmacokinetics — Metabolism). CELEBREX should be introduced at the lowest recommended dose in patients receiving fluconazole. **Lithium:** In a study conducted in healthy subjects, mean steady-state lithium plasma levels increased approximately 17% in subjects receiving lithium 450 mg BID with CELEBREX 200 mg BID as compared to subjects receiving lithium alone. Patients on lithium treatment should be closely monitored when CELEBREX is introduced or withdrawn. **Methotrexate:** In an interaction study of rheumatoid arthritis patients taking methotrexate, CELEBREX did not have a significant effect on the pharmacokinetics of methotrexate. **Warfarin:** Anticoagulant activity should be monitored, particularly in the first few days, after initiating or changing CELEBREX therapy in patients receiving warfarin or similar agents, since these patients are at an increased risk of bleeding complications. The effect of celecoxib on the anticoagulant effect of warfarin was studied in a group of healthy subjects receiving daily doses of 2–5 mg of warfarin. In these subjects, celecoxib did not alter the anticoagulant effect of warfarin as determined by prothrombin time. However, in post-marketing experience, bleeding events have been reported, predominantly in the elderly, in association with increases in prothrombin time in patients receiving CELEBREX concurrently with warfarin. **Carcinogenesis, mutagenesis, impairment of fertility:** Celecoxib was not carcinogenic in rats given oral doses up to 200 mg/kg for males and 10 mg/kg for females (approximately 2- to 4-fold the human exposure as measured by the AUC_{0–24} at 200 mg BID) or in mice given oral doses up to 25 mg/kg for males and 50 mg/kg for females (approximately equal to human exposure as measured by the AUC_{0–24} at 200 mg BID) for two years. Celecoxib was not mutagenic in an Ames test and a mutation assay in Chinese hamster ovary (CHO) cells, nor clastogenic in a chromosome aberration assay in CHO cells and an *in vivo* micronucleus test in rat bone marrow. Celecoxib did not impair male and female fertility in rats at oral doses up to 600 mg/kg/day (approximately 11-fold human exposure at 200 mg BID based on the AUC_{0–24}).

Pregnancy: Teratogenic effects: Pregnancy Category C. Celecoxib was not teratogenic in rabbits up to an oral dose of 60 mg/kg/day (equal to human exposure at 200 mg BID as measured by AUC_{0–24}); however, at oral doses \geq 150 mg/kg/day (approximately 2-fold human exposure at 200 mg BID as measured by AUC_{0–24}), an increased incidence of fetal alterations, such as ribs fused, sternbrae fused and sternbrae misshapen, was observed. A dose-dependent increase in diaphragmatic hernias was observed in one of two rat studies at oral doses \geq 30 mg/kg/day (approximately 6-fold human exposure based on the AUC_{0–24} at 200 mg BID). There are no studies in pregnant women. CELEBREX should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Nonteratogenic effects:** Celecoxib produced preimplantation and post-implantation losses and reduced embryo/fetal survival in rats at oral dosages \geq 50 mg/kg/day (approximately 6-fold human exposure based on the AUC_{0–24} at 200 mg BID). These changes are expected with inhibition of prostaglandin synthesis and are not the result of permanent alteration of female reproductive function, nor are they expected at clinical exposures. No studies have been conducted to evaluate the effect of celecoxib on the closure of the ductus arteriosus in humans. Therefore, use of CELEBREX during the third trimester of pregnancy should be avoided. **Labor and delivery:** Celecoxib produced no evidence of delayed labor or parturition at oral doses up to 100 mg/kg in rats (approximately 7-fold human exposure as measured by the AUC_{0–24} at 200 mg BID). The effects of CELEBREX on labor and delivery in pregnant women are unknown. **Nursing mothers:** It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk and because of the potential for serious adverse reactions in nursing infants from CELEBREX, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother.

CELEBREX[®] (celecoxib capsules)

Pediatric Use: Safety and effectiveness in pediatric patients below the age of 18 years have not been evaluated.

Geriatric Use: Of the total number of patients who received CELEBREX in clinical trials, more than 2,100 were 65–74 years of age, while approximately 800 additional patients were 75 years and over. While the incidence of adverse experiences tended to be higher in elderly patients, no substantial differences in safety and effectiveness were observed between these subjects and younger subjects. Other reported clinical experience has not identified differences in response between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out. In clinical studies comparing renal function as measured by the GFR, BUN and creatinine, and platelet function as measured by bleeding time and platelet aggregation, the results were not different between elderly and young volunteers.

ADVERSE REACTIONS

Adverse events occurring in $\geq 2\%$ of Celebrex patients from controlled arthritis trials, regardless of causality at recommended doses (N=4146): abdominal pain 4.1%, diarrhea 5.6%, dyspepsia 8.8%, flatulence 2.2%, nausea 3.5%, back pain 2.8%, peripheral edema 2.1%, injury-accidental 2.9%, dizziness 2.0%, headache 15.8%, insomnia 2.3%, pharyngitis 2.3%, rhinitis 2.0%, sinusitis 5.0%, upper respiratory tract infection 8.1%, rash 2.2%. In placebo- or active-controlled clinical trials, the discontinuation rate due to adverse events was 7.1% for patients receiving CELEBREX and 6.1% for patients receiving placebo. Among the most common reasons for discontinuation due to adverse events in the CELEBREX treatment groups were dyspepsia and abdominal pain (cited as reasons for discontinuation in 0.8% and 0.7% of CELEBREX patients, respectively). Among patients receiving placebo, 0.6% discontinued due to dyspepsia and 0.6% withdrew due to abdominal pain. The following adverse events occurred in 0.1–1.9% of patients regardless of causality.

Celebrex (100–200 mg BID or 200 mg QD): **GI:** Constipation, diverticulitis, dysphagia, eructation, esophagitis, gastritis, gastroenteritis, gastroesophageal reflux, hemorrhoids, hiatal hernia, melena, dry mouth, stomatitis, tenesmus, tooth disorder, vomiting; **Cardiovascular:** Aggravated hypertension, angina pectoris, coronary artery disorder, myocardial infarction; **General:** Allergy aggravated, allergic reaction, asthenia, chest pain, cyst NOS, edema generalized, face edema, fatigue, fever, hot flushes, influenza-like symptoms, pain, peripheral pain; **Resistance mechanism disorders:** Herpes simplex, herpes zoster, infection bacterial, infection fungal, infection soft tissue, infection viral, moniliasis, moniliasis genital, otitis media; **Central, peripheral nervous system:** Leg cramps, hypertonia, hypoesthesia, migraine, neuralgia, neuropathy, paresthesia, vertigo; **Female reproductive:** Breast fibroadenosis, breast neoplasm, breast pain, dysmenorrhea, menstrual disorder, vaginal hemorrhage, vaginitis; **Male reproductive:** Prostatic disorder; **Hearing and vestibular:** Deafness, ear abnormality, earache, tinnitus; **Heart rate and rhythm:** Palpitation, tachycardia; **Liver and biliary system:** Hepatic function abnormal, SGOT increased, SGPT increased; **Metabolic and nutritional:** BUN increased, CPK increased, diabetes mellitus, hypercholesterolemia, hyperglycemia, hypokalemia, NPN increase, creatinine increased, alkaline phosphatase increased, weight increase; **Musculoskeletal:** Arthralgia, arthrosis, bone disorder, fracture accidental, myalgia, neck stiffness, synovitis, tendinitis; **Platelets (bleeding or clotting):** Ecchymosis, epistaxis, thrombocytopenia; **Psychiatric:** Anorexia, anxiety, appetite increased, depression, nervousness, somnolence; **Hemic:** Anemia; **Respiratory:** Bronchitis, bronchospasm, bronchospasm aggravated, coughing, dyspnea, laryngitis, pneumonia; **Skin and appendages:** Alopecia, dermatitis, nail disorder, photosensitivity reaction, pruritus, rash erythematous, rash maculopapular, skin disorder, skin dry, sweating increased, urticaria; **Application site disorders:** Cellulitis, dermatitis contact, injection site reaction, skin nodule; **Special senses:** Taste perversion; **Urinary system:** Albuminuria, cystitis, dysuria, hematuria, micturition frequency, renal calculus, urinary incontinence, urinary tract infection; **Vision:** Blurred vision, cataract, conjunctivitis, eye pain, glaucoma.

Other serious adverse reactions which occur rarely (estimated < 0.1%), regardless of causality: The following serious adverse events have occurred rarely in patients taking CELEBREX. Cases reported only in the post-marketing experience are indicated in italics. **Cardiovascular:** Syncope, congestive heart failure, ventricular fibrillation, pulmonary embolism, cerebrovascular accident, peripheral gangrene, thrombophlebitis, *vasculitis*; **GI:** Intestinal obstruction, intestinal perforation, gastrointestinal bleeding, colitis with bleeding, esophageal perforation, pancreatitis, ileus; **Liver and biliary system:** Cholelithiasis, *hepatitis, jaundice, liver failure*; **Hemic and lymphatic:** Thrombocytopenia, *agranulocytosis, aplastic anemia, pancytopenia, leukopenia*; **Metabolic:** *Hypoglycemia*; **Nervous system:** Ataxia, suicide; **Renal:** Acute renal failure, *interstitial nephritis*; **Skin:** *Erythema multiforme, exfoliative dermatitis, Stevens-Johnson syndrome, toxic epidermal necrolysis*; **General:** Sepsis, sudden death, *anaphylactoid reaction, angioedema*.

OVERDOSAGE

Symptoms following acute NSAID overdoses are usually limited to lethargy, drowsiness, nausea, vomiting, and epigastric pain, which are generally reversible with supportive care. GI bleeding can occur. Hypertension, acute renal failure, respiratory depression and coma may occur, but are rare. Anaphylactoid reactions have been reported with therapeutic ingestion of NSAIDs, and may occur following an overdose. Patients should be managed by symptomatic and supportive care following an NSAID overdose. There are no specific antidotes. No information is available regarding the removal of celecoxib by hemodialysis, but based on its high degree of plasma protein binding (>97%) dialysis is unlikely to be useful in overdose. Emesis and/or activated charcoal (60 to 100 g in adults, 1 to 2 g/kg in children) and/or osmotic cathartic may be indicated in patients seen within 4 hours of ingestion with symptoms or following a large overdose. Forced diuresis, alkalization of urine, hemodialysis, or hemoperfusion may not be useful due to high protein binding.

Mfd. by Searle Ltd.
Caguas PR 00725Marketed by: G.D. Searle & Co.
Chicago IL 60680 USA

Pfizer Inc., New York NY 10017 USA

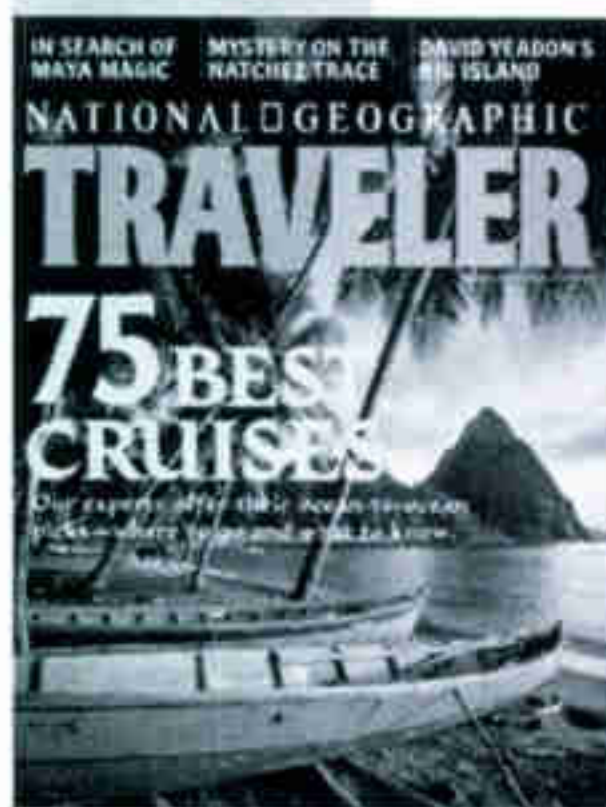
Address medical inquiries to:
G.D. Searle & Co.Healthcare Information Services
5200 Old Orchard Rd.

Skokie IL 60077

~ 1/7/00 • CE18813V

©2000, G.D. Searle & Co.
celb0100.b0403

Where the journey begins.

**Only \$17⁹⁵***Eight colorful
issues per year.

Begin your journey
with NATIONAL
GEOGRAPHIC
TRAVELER, and get set
for some fresh new
experiences! You'll
expand your choices
for travel and get the
tools you need to
make that dream
excursion possible.

Turn to **TravelWise**,
a special section that pro-
vides detailed advice about how
to plan for your trip, where to
eat and stay, what to see and do.
Get the scoop on techniques
and equipment advice from
world-class photographers in
Behind the Lens. All the
essentials are at your fingertips
with NATIONAL GEOGRAPHIC
TRAVELER. Order your new
adventures today!

Call 1-800-NGS-LINE

(1-800-647-5463)

M–F, 8 a.m.–midnight ET; Sat., 8:30 a.m.–7 p.m.

TDD only: 1-800-548-9797, U.S. and Canada only.

Or write to address below:

P.O. Box 63001
Tampa, FL 33663-3001

*U.S. funds: US\$24.35 (C\$33.10) for Canada (includes 7% GST); US\$26.17 (C\$35.57) for NB, NF, or NS (includes 15% HST). Add sales tax: DC, 5.75%; KY, 6%; MD, 5%. To join the National Geographic Society and receive NATIONAL GEOGRAPHIC magazine for one year (12 monthly issues), please send your name, address, and remittance of US\$29 for the U.S., US\$32 (C\$46) for Canada, or US\$39 for all other countries, to above address. Add sales tax: KY, 6%; MD, 5%. Canadian dues include 7% GST. While all dues support the Society's mission of expanding geographic knowledge, 80% is designated for the magazine subscription, and no portion should be considered a charitable contribution.

TRAOK1



Family Photos

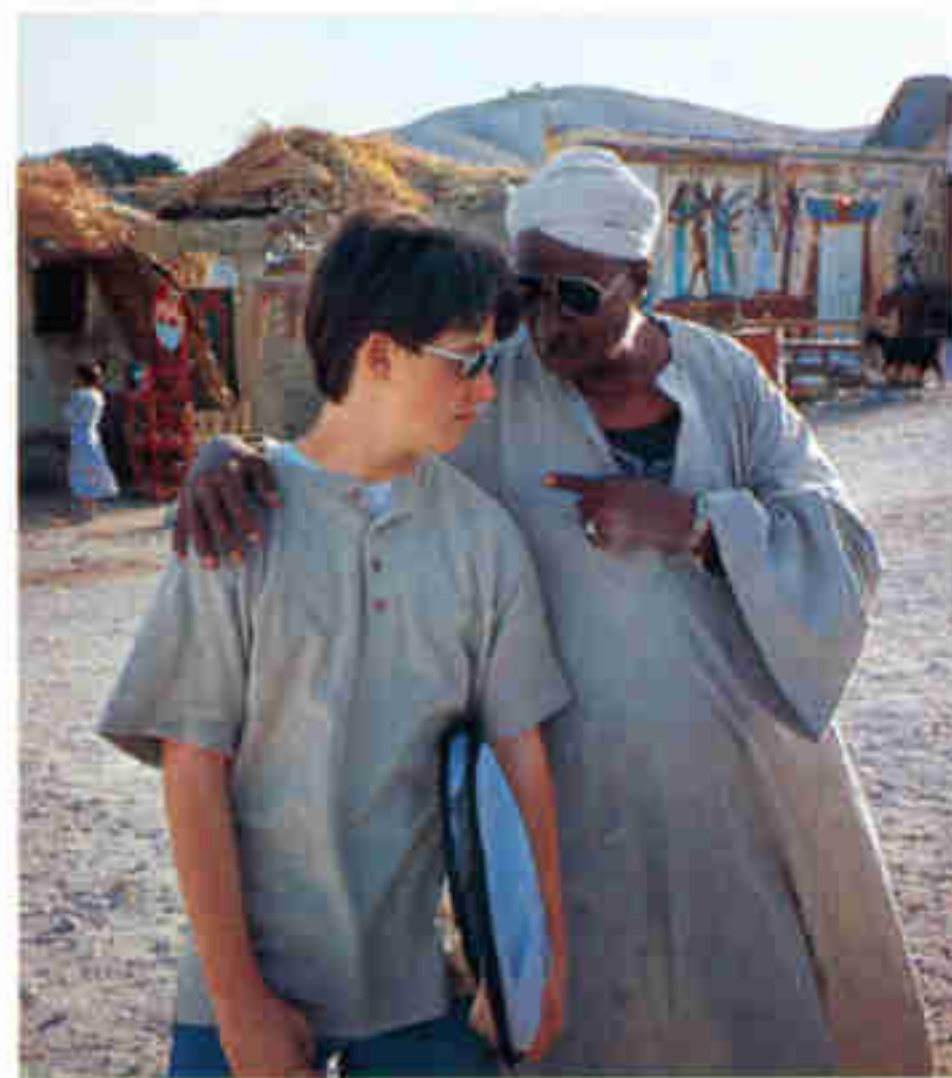
A life behind the lens

“I have been in the family business since I was six months old,” Yari Wolinsky wrote in his college application, “and have never thought for a moment of quitting.” Traveling with his father, Cary, whose photographs often appear in the *GEOGRAPHIC*, Yari had worked on every continent but Antarctica by the time he was six. (You can read Yari’s essay at Online Extra, nationalgeographic.com/ngm/0107.)

In China he served as crowd stopper (top), diverting attention so his father could work in



peace. At a banquet in Suzhou, Yari outlasted all the other guests in matching toasts with the host, “he with lethal mao-tai, me with a bottle of soy milk. Both of us were carried from the room.”



In Papua New Guinea (above left) Yari befriended a mudman dancer. By age 14 in Egypt (above), he was helping to haul 200 pounds of lighting equipment and holding up a reflector disk, here under his arm, that seemed to “concentrate enough light to melt whatever, or whoever, is to be photographed.”

Recently in San Diego Yari was behind the camera (left), taping video for our website of his father’s coverage on long-term space travel (January 2001).

Now a sophomore at Bard College in New York State, Yari declares himself to be merely on a “four-year sabbatical” from the Wolinsky family business: “I have no plan for retirement.”

He hopes to be . . . a writer.



ALL BY CARY WOLINSKY



©2001 Jenn-Air

Even a slab of granite can dream.



Fantasy becomes reality with the new Jenn-Air Cooktop. Dream of true gourmet results, with up to 12,000 BTUs of cooking energy. Now imagine precision flame control, the flexibility of six separate burners and a design that's as easy to use as it is on your eyes. For more information, visit jennair.com or call 1-800-Jenn-Air. And make your dream kitchen come true.

 JENN-AIR



MARIA STENZEL

Digging In

New hope in Madagascar

Paleontologists usually take things away from excavations: bones, skulls, teeth. David Krause also gives things back: a school, a clinic, hope.

David (above) led a team to

Madagascar in 1996. There, near the village of Berivotra, he discovered what he described in his *GEOGRAPHIC* article last August as “a bonanza” of dinosaur fossils. But David, a professor at State University of New York at Stony Brook whose work has been supported by the Society, discovered as well that the villagers lacked

education and health care. “We found a way to thank a community that had welcomed us with open arms,” he says.

Out of their own pockets David’s team raised \$500—enough to hire a teacher for two years. Back in New York they raised funds for construction of a village schoolhouse. When they returned to Berivotra in 1999, they took along a physician’s assistant and a dentist; this summer they plan to dig a well and build toilets and teacher housing. David’s dream is to construct a permanent clinic there, and he’s established a foundation to do just that: the Madagascar Ankizy Fund (www.ankizy.org), after the Malagasy word for “children.”

A Burning Passion

Virginia Vincent (right) is back at her fire lookout tower on Stark Mountain in Lolo National Forest in western Montana this summer, as she has been nearly every year since 1970. In 1946, when she was 16, she read in *NATIONAL GEOGRAPHIC* about a woman lookout in Washington State. “That took my fancy,” she says. “I had it on my mind all my life.” Climbing 20 feet to her tower keeps her in shape; so does a walk to the privy 300 feet down the hillside.



GORDON WILTSIE

FOR MORE INFORMATION

Call: 1-800-NGS-LINE

(1-800-647-5463) Toll free from U.S., Canada, 8 a.m.-midnight ET, Mon.-Fri. 8:30 a.m.-7 p.m. ET, Sat.

For a free catalog call:

1-800-447-0647

Special device for the hearing-impaired (TDD) 1-800-548-9797

Write: National Geographic Society

PO Box 98199

Washington, DC 20090-8199

Internet: nationalgeographic.com

LION AND CUB POSTER



A limited-edition print of Mattias Klum’s Asiatic lions (June 2001 *GEOGRAPHIC*) is available for \$39.95 plus \$6.50 for postage and handling (\$9.50 for international orders). Please add sales tax for orders sent to CA, DC, FL, KY, MD, MI, PA, and Canada. We will produce only as many 24-by-30-inch posters as we receive orders for by July 31, 2001. Each will be hand-numbered and embossed with the Society seal. Shipping is scheduled for September 2001. **Call toll free: 1-888-647-7301** (Outside the U.S. and Canada call 1-515-362-3353) **Mail orders to:** National Geographic, PO Box 11303, Des Moines, IA 50340-1303

Car insurance
with no State Farm Agent?
Now that scares me.

State Farm Customer
Kerry Klimecki

As you can see, tower maintenance man Kerry Klimecki doesn't have a fear of heights. He does, however, have a fear of any kind of car insurance that doesn't come with a State Farm Agent. Want to play it safe with your car insurance? Be like Kerry, and go with the helpful service and competitive rates you get with a State Farm Agent.

Like a good neighbor, State Farm is there.®

State Farm Mutual Automobile Insurance Company (not in NJ) • Home Office: Bloomington, Illinois • statefarm.com™ • AOL Keyword: State Farm



nationalgeographic.com

Webscapes

■ **SICK OF SPRAWL?**
Stroll through a virtual “new urbanist” town to see what some planners prescribe for the ills of urban sprawl.

nationalgeographic.com/sprawl

■ **PLAN A TRIP**

Get in-depth information on U.S. and Canada hot spots, including city and park highlights, driving tours, bird-watching tips, web links, and much more.

nationalgeographic.com/destinations

■ **MONHEGAN ISLAND**
Former NGS intern turned freelance photographer Amy Toensing returned to the magazine to cover this tightly knit lobstering community off the Maine coast. She tells about her work in a video interview.

nationalgeographic.com/ngm/0107/feature5

■ **GLOBAL GETAWAYS**

Want to treat yourself to a Danish getaway? Allan Strauss, editor of our Scandinavian editions, describes his favorite destinations in Denmark.

nationalgeographic.com/ngm/0107/getaways.html

Send us comments:
online@nationalgeographic.com

Register for our e-mail newsletter:
nationalgeographic.com/register.html

E-mail for Member Services:
ngsline@customersvc.com

Travel With Marco Polo

Follow in the footsteps of the famed adventurer in a special multimedia presentation of this three-part magazine series. Immersed in images of the 21st century that mirror the 13th—like this fishing crew leaving Adimalathuri, India—you will travel with Polo from Venice to China to India, and finally to a Genoese jail. nationalgeographic.com/ngm/0107/feature2/media.html



MICHAEL YAMASHITA



NATIONAL ARCHIVES

Pearl Harbor: Beyond the Movie

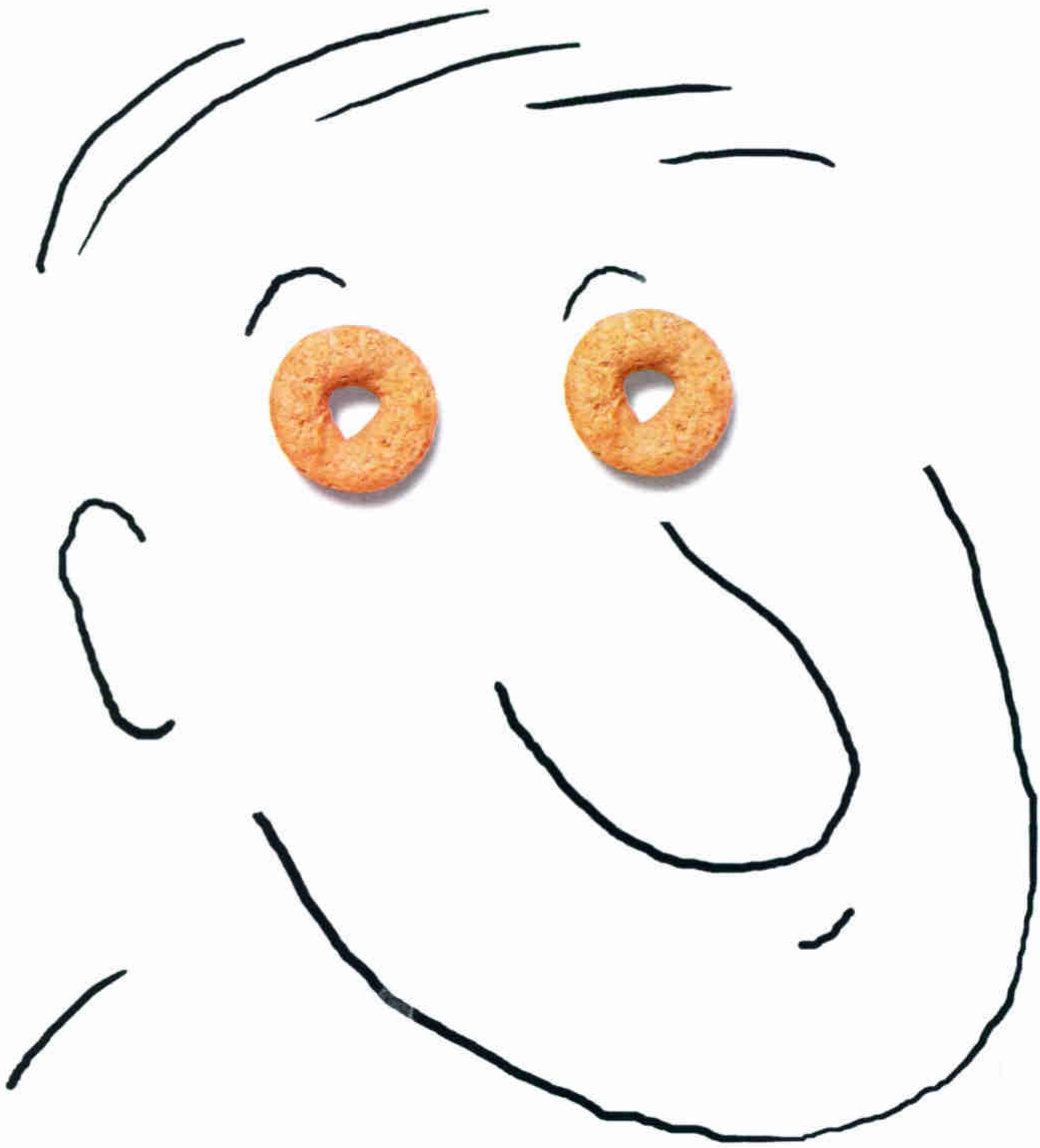
Uncover the true tales that inspired the new film—and a few that have so far gone untold. Survivors' stories from our readers and a multimedia map let you experience the World War II attack moment by moment, target by target. nationalgeographic.com/pearlharbor

Extreme Antarctica

Stuck on an icebreaker, correspondent Mark Christmas spent 40 sun-starved days off the coldest continent. Find dispatches, photos, video, and more at nationalgeographic.com/sealab/antarctica.



MARIA STENZEL



Looking for a tasty way to lower
your cholesterol?

A recent study has proven that the whole-grain oats in Cheerios can actually help lower your cholesterol when added to a low-fat diet.* Try it for yourself, you'll see.

The 1 and Only Cheerios®



* 3 oz daily. About 4% average reduction.

National Geographic TV



EXPLORER, CNBC,
JULY 22, 8 P.M. ET/PT

Bear Watch

Fishing in the dark, a brown bear snags a salmon in Alaska's Katmai National Park. "You want a bear with a full stomach," says photographer Joel Sartore, explaining how he was able to sneak so close—20 yards—for the unusual night shot. *Assignment: Great Grizzlies* follows Sartore as he shows what it takes to photograph one of nature's most fearsome and fascinating creatures.

JOEL SARTORE

NATIONAL GEOGRAPHIC CHANNEL

High Science

Have sandhill cranes learned how to migrate more than a thousand miles from Wisconsin to Florida by following an ultralight aircraft? How important—and threatening—are robots to our future? Should forest fires be allowed to burn? To probe such questions from nature and from cutting-edge laboratory research, National Geographic Channel is teaming up with New York Times Television to produce a weekly program devoted to



OPERATION MIGRATION

the sciences. Airing on Tuesdays at 9 p.m., *Science Times* provides up-to-date reports on everything from natural history and space exploration

to health and conservation issues. Joining the talents of two giants in journalism, *Science Times* will change how we understand the world.

National Geographic EXPLORER CNBC. Weekends, 8 p.m. ET/PT. National Geographic Specials PBS. See local listings. National Geographic Videos, Kids Videos, and DVDs Call 1-800-627-5162. National Geographic Channel Call your cable or satellite provider.

■ Programming information accurate at press time; consult local listings or our website at nationalgeographic.com.

For people with Acid Reflux Disease

It's time to check your tummy out of the Heartburn Hotel.

Complete 24-hour heartburn relief is possible. Ask your doctor about Prevacid.

If you're suffering from persistent heartburn two or more days a week, even though you've treated it and changed your diet, it could be a sign of Acid Reflux Disease.

- Prevacid is a prescription medicine that can mean complete day and night relief from heartburn associated with Acid Reflux Disease. Individual results may vary.
- Once-a-day Prevacid works in a different way than over-the-counter heartburn remedies. Prevacid turns off tiny pumps that produce acid in your stomach.



Tiny pumps produce acid in your stomach.



Prevacid turns many of these pumps off.

- Millions of prescriptions have been written for Prevacid.
- Prevacid has a low occurrence of side effects, such as diarrhea (3.6%), abdominal pain (1.8%) and nausea (1.4%).

Ask your doctor for more information about Prevacid and if it's right for you. Find out how 24-hour Prevacid can help you and your tummy check out of the Heartburn Hotel.

For a free information kit call 1-888-607-ACID

PREVACID[®]

LANSOPRAZOLE 15-mg and 30-mg capsules

Leave your heartburn behind

www.prevacid.com

Please see next page for additional important information.

Brief Summary of Prescribing Information
(Nos. 1541, 3046)
03-5073-R15-Br., Rev. November, 2000

PREVACID®

(prě-va-sid)
(lansoprazole)

Delayed-Release Capsules

INDICATIONS AND USAGE

PREVACID Delayed-Release Capsules are indicated for: 1. Short-Term Treatment of Active Duodenal Ulcer 2. *H. pylori* Eradication to Reduce the Risk of Duodenal Ulcer Recurrence 3. Maintenance of Healed Duodenal Ulcers 4. Short-Term Treatment of Active Benign Gastric Ulcer 5. Healing of NSAID-Associated Gastric Ulcer 6. Risk Reduction of NSAID-Associated Gastric Ulcer 7. Treatment of Heartburn and Other Symptoms Associated with GERD (Gastroesophageal Reflux Disease) 8. Short-Term Treatment of Erosive Esophagitis 9. Maintenance of Healing of Erosive Esophagitis 10. Pathological Hypersecretory Conditions Including Zollinger-Ellison Syndrome.

CONTRAINDICATIONS

PREVACID Delayed-Release Capsules are contraindicated in patients with known hypersensitivity to any component of the formulation.

Amoxicillin is contraindicated in patients with a known hypersensitivity to any penicillin. (Please refer to full prescribing information for amoxicillin before prescribing.)

Clarithromycin is contraindicated in patients with a known hypersensitivity to any macrolide antibiotic, and in patients receiving terfenadine therapy who have preexisting cardiac abnormalities or electrolyte disturbances. (Please refer to full prescribing information for clarithromycin before prescribing.)

WARNINGS

CLARITHROMYCIN SHOULD NOT BE USED IN PREGNANT WOMEN EXCEPT IN CLINICAL CIRCUMSTANCES WHERE NO ALTERNATIVE THERAPY IS APPROPRIATE. IF PREGNANCY OCCURS WHILE TAKING CLARITHROMYCIN, THE PATIENT SHOULD BE APPRISED OF THE POTENTIAL HAZARD TO THE FETUS. (SEE WARNINGS IN PRESCRIBING INFORMATION FOR CLARITHROMYCIN.)

Pseudomembranous colitis has been reported with nearly all antibacterial agents, including clarithromycin and amoxicillin, and may range in severity from mild to life threatening. Therefore, it is important to consider this diagnosis in patients who present with diarrhea subsequent to the administration of antibacterial agents.

Treatment with antibacterial agents alters the normal flora of the colon and may permit overgrowth of clostridia. Studies indicate that a toxin produced by *Clostridium difficile* is a primary cause of "antibiotic-associated colitis."

After the diagnosis of pseudomembranous colitis has been established, therapeutic measures should be initiated. Mild cases of pseudomembranous colitis usually respond to discontinuation of the drug alone. In moderate to severe cases, consideration should be given to management with fluids and electrolytes, protein supplementation, and treatment with an antibacterial drug clinically effective against *Clostridium difficile* colitis.

Serious and occasionally fatal hypersensitivity (anaphylactic) reactions have been reported in patients on penicillin therapy. These reactions are more apt to occur in individuals with a history of penicillin hypersensitivity and/or a history of sensitivity to multiple allergens.

There have been well-documented reports of individuals with a history of penicillin hypersensitivity reactions who have experienced severe hypersensitivity reactions when treated with a cephalosporin. Before initiating therapy with any penicillin, careful inquiry should be made concerning previous hypersensitivity reactions to penicillins, cephalosporins, and other allergens. If an allergic reaction occurs, amoxicillin should be discontinued and the appropriate therapy instituted.

SERIOUS ANAPHYLACTIC REACTIONS REQUIRE IMMEDIATE EMERGENCY TREATMENT WITH EPINEPHRINE, OXYGEN, INTRAVENOUS STEROIDS, AND AIRWAY MANAGEMENT, INCLUDING INTUBATION, SHOULD ALSO BE ADMINISTERED AS INDICATED.

PRECAUTIONS

General

Symptomatic response to therapy with lansoprazole does not preclude the presence of gastric malignancy.

Information for Patients

PREVACID Delayed-Release Capsules should be taken before eating.

Alternative Administration Options

For patients who have difficulty swallowing capsules, PREVACID Delayed-Release Capsules can be opened, and the intact granules contained within can be sprinkled on one tablespoon of either applesauce, ENSURE® pudding, cottage cheese, yogurt, or strained pears and swallowed immediately. The granules should not be chewed or crushed. Alternatively, PREVACID Delayed-Release Capsules may be emptied into a small volume of either orange juice or tomato juice (60 mL—approximately 2 ounces), mixed briefly and swallowed immediately. To insure complete delivery of the dose, the glass should be rinsed with two or more volumes of juice and the contents swallowed immediately. The granules have also been shown *in vitro* to remain intact when exposed to apple, cranberry, grape, orange, pineapple, prune, tomato, and V-8® vegetable juice and stored for up to 30 minutes.

For patients who have a nasogastric tube in place, PREVACID Delayed-Release Capsules can be opened and the intact granules mixed in 40 mL of apple juice and injected through the nasogastric tube into the stomach. After administering the granules, the nasogastric tube should be flushed with additional apple juice to clear the tube.

Drug Interactions

Lansoprazole is metabolized through the cytochrome P₄₅₀ system, specifically through the CYP3A and CYP2C19 isozymes. Studies have shown that lansoprazole does not have clinically significant interactions with other drugs metabolized by the cytochrome P₄₅₀ system, such as warfarin, antipyrine, indomethacin, ibuprofen, phenytoin, propranolol, prednisone, diazepam, clarithromycin, or terfenadine in healthy subjects. These compounds are metabolized through various cytochrome P₄₅₀ isozymes including CYP1A2, CYP2C9, CYP2C19, CYP2D6, and CYP3A. When lansoprazole was administered concomitantly with theophylline (CYP1A2, CYP3A), a minor increase (10%) in the clearance of theophylline was seen. Because of the small magnitude and the direction of the effect on theophylline clearance, this interaction is unlikely to be of clinical concern. Nonetheless, individual patients may require additional titration of their theophylline dosage when lansoprazole is started or stopped to ensure clinically effective blood levels.

Lansoprazole has also been shown to have no clinically significant interaction with amoxicillin.

In a single-dose crossover study examining lansoprazole 30 mg and omeprazole 20 mg each administered alone and concomitantly with sucralfate 1 gram, absorption of the proton pump inhibitors was delayed and their bioavailability was reduced by 17% and 16%, respectively,

when administered concomitantly with sucralfate. Therefore, proton pump inhibitors should be taken at least 30 minutes prior to sucralfate. In clinical trials, antacids were administered concomitantly with PREVACID Delayed-Release Capsules; this did not interfere with its effect.

Lansoprazole causes a profound and long-lasting inhibition of gastric acid secretion; therefore, it is theoretically possible that lansoprazole may interfere with the absorption of drugs where gastric pH is an important determinant of bioavailability (eg, ketoconazole, ampicillin esters, iron salts, dipoxin).

Carcinogenesis, Mutagenesis, Impairment of Fertility

In two 24-month carcinogenicity studies, Sprague-Dawley rats were treated orally with doses of 5 to 150 mg/kg/day, about 1 to 40 times the exposure on a body surface (mg/m²) basis, of a 50-kg person of average height (1.46 m² body surface area) given the recommended human dose of 30 mg/day (22.2 mg/m²). Lansoprazole produced dose-related gastric enterochromaffin-like (ECL) cell hyperplasia and ECL cell carcinoids in both male and female rats. It also increased the incidence of intestinal metaplasia of the gastric epithelium in both sexes. In male rats, lansoprazole produced a dose-related increase of testicular interstitial cell adenomas. The incidence of these adenomas in rats receiving doses of 15 to 150 mg/kg/day (4 to 40 times the recommended human dose based on body surface area) exceeded the low background incidence (range = 1.4 to 10%) for this strain of rat. Testicular interstitial cell adenoma also occurred in 1 of 30 rats treated with 50 mg/kg/day (13 times the recommended human dose based on body surface area) in a 1-year toxicity study.

In a 24-month carcinogenicity study, CD-1 mice were treated orally with doses of 15 to 600 mg/kg/day, 2 to 80 times the recommended human dose based on body surface area. Lansoprazole produced a dose-related increased incidence of gastric ECL cell hyperplasia. It also produced an increased incidence of liver tumors (hepatocellular adenoma plus carcinoma). The tumor incidences in male mice treated with 300 and 600 mg/kg/day (40 to 80 times the recommended human dose based on body surface area) and female mice treated with 150 to 600 mg/kg/day (20 to 80 times the recommended human dose based on body surface area) exceeded the ranges of background incidences in historical controls for this strain of mice. Lansoprazole treatment produced adenoma of rete testis in male mice receiving 75 to 600 mg/kg/day (10 to 80 times the recommended human dose based on body surface area).

Lansoprazole was not genotoxic in the Ames test, the *in vivo* rat hepatocyte unscheduled DNA synthesis (UDS) test, the *in vivo* mouse micronucleus test or the rat bone marrow cell chromosomal aberration test. It was positive in *in vitro* human lymphocyte chromosomal aberration assays.

Lansoprazole at oral doses up to 150 mg/kg/day (40 times the recommended human dose based on body surface area) was found to have no effect on fertility and reproductive performance of male and female rats.

Pregnancy: Teratogenic Effects.

Pregnancy Category B

Lansoprazole

Teratology studies have been performed in pregnant rats at oral doses up to 150 mg/kg/day (40 times the recommended human dose based on body surface area) and pregnant rabbits at oral doses up to 30 mg/kg/day (16 times the recommended human dose based on body surface area) and have revealed no evidence of impaired fertility or harm to the fetus due to lansoprazole.

There are, however, no adequate or well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

Pregnancy Category C

Clarithromycin

See WARNINGS (above) and full prescribing information for clarithromycin before using in pregnant women.

Nursing Mothers

Lansoprazole or its metabolites are excreted in the milk of rats. It is not known whether lansoprazole is excreted in human milk. Because many drugs are excreted in human milk, because of the potential for serious adverse reactions in nursing infants from lansoprazole, and because of the potential for tumorigenicity shown for lansoprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother.

Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

Use in Women

Over 800 women were treated with lansoprazole. Ulcer healing rates in females were similar to those in males. The incidence rates of adverse events were also similar to those seen in males.

Use in Geriatric Patients

Ulcer healing rates in elderly patients are similar to those in a younger age group. The incidence rates of adverse events and laboratory test abnormalities are also similar to those seen in younger patients. For elderly patients, dosage and administration of lansoprazole need not be altered for a particular indication.

ADVERSE REACTIONS

Clinical

Worldwide, over 6100 patients have been treated with lansoprazole in Phase 2-3 clinical trials involving various dosages and durations of treatment. In general, lansoprazole treatment has been well-tolerated in both short-term and long-term trials.

The following adverse events were reported by the treating physician to have a possible or probable relationship to drug in 1% or more of PREVACID-treated patients and occurred at a greater rate in PREVACID-treated patients than placebo-treated patients:

Incidence of Possibly or Probably

Treatment-Related Adverse Events in Short-Term, Placebo-Controlled Studies

Body System/Adverse Event	PREVACID (N=1457) %	Placebo (N=467) %
Body as a Whole		
Abdominal Pain	1.8	1.3
Digestive System		
Diarrhea	3.6	2.6
Nausea	1.4	1.3

Headache was also seen at greater than 1% incidence but was more common on placebo. The incidence of diarrhea was similar between patients who received placebo and patients who received lansoprazole 15 mg and 30 mg, but higher in the patients who received lansoprazole 60 mg (2.9%, 1.4%, 4.2%, and 7.4%, respectively).

The most commonly reported possibly or probably treatment-related adverse event during maintenance therapy was diarrhea.

In the risk reduction study of PREVACID for NSAID-associated gastric ulcers, the incidence of diarrhea for patients treated with PREVACID was 5%, misoprostol 22%, and placebo 3%.

Additional adverse experiences occurring in <1% of patients or subjects in domestic trials are shown below. Refer to Postmarketing for adverse reactions occurring since the drug was marketed.

Body as a Whole - asthenia, candidiasis, chest pain (not otherwise specified), edema, fever, flu syndrome, halitosis, infection (not otherwise specified), malaise; **Cardiovascular System** - angina, cerebrovascular accident, hypertension/hypotension, myocardial infarction, palpitations, shock (circulatory failure), vasodilation; **Digestive System** - anorexia, bezoar, cardiospasm, cholelithiasis, constipation, dry mouth/thirst, dyspepsia, dysphagia, eructation, esophageal stenosis, esophageal ulcer, esophagitis, fecal discoloration, flatulence, gastric nodules/fundic gland polyps, gastroenteritis, gastrointestinal hemorrhage, hematemesis, increased appetite, increased salivation, melena, rectal hemorrhage, stomatitis, tenesmus, ulcerative colitis; **Endocrine System** - diabetes mellitus, goiter, hyperglycemia/hypoglycemia; **Hemic and Lymphatic System** - anemia, hemolysis; **Metabolic and Nutritional Disorders** - gout, weight gain/loss; **Musculoskeletal System** - arthritis/arthritis, musculoskeletal pain, myalgia; **Nervous System** - agitation, amnesia, anxiety, apathy, confusion, depression, dizziness/syncope, hallucinations, hemiplegia, hostility aggravated, libido decreased, nervousness, paresthesia, thinking abnormality; **Respiratory System** - asthma, bronchitis, cough increased, dyspnea, epistaxis, hemoptysis, hiccups, pneumonia, upper respiratory inflammation/infection; **Skin and Appendages** - acne, alopecia, pruritus, rash, urticaria; **Special Senses** - blurred vision, deafness, eye pain, otitis media, taste perversion, tinnitus, visual field defect; **Urogenital System** - abnormal menses, albuminuria, breast enlargement/gynecomastia, breast tenderness, glycosuria, hematuria, impotence, kidney calculus.

Postmarketing

On-going Safety Surveillance: Additional adverse experiences have been reported since lansoprazole has been marketed. The majority of these cases are foreign-sourced and a relationship to lansoprazole has not been established. Because these events were reported voluntarily from a population of unknown size, estimates of frequency cannot be made. These events are listed below by COSTART body system.

Body as a Whole - anaphylactoid-like reaction; **Digestive System** - hepatotoxicity, vomiting; **Hemic and Lymphatic System** - agranulocytosis, aplastic anemia, hemolytic anemia, leukopenia, neutropenia, pancytopenia, thrombocytopenia, and thrombotic thrombocytopenic purpura; **Special Senses** - speech disorder; **Urogenital System** - urinary retention.

Combination Therapy with Amoxicillin and Clarithromycin

In clinical trials using combination therapy with PREVACID plus amoxicillin and clarithromycin, and PREVACID plus amoxicillin, no adverse reactions peculiar to these drug combinations were observed. Adverse reactions that have occurred have been limited to those that had been previously reported with PREVACID, amoxicillin, or clarithromycin.

Triple Therapy: PREVACID/amoxicillin/clarithromycin

The most frequently reported adverse events for patients who received triple therapy for 14 days were diarrhea (7%), headache (6%), and taste perversion (5%). There were no statistically significant differences in the frequency of reported adverse events between the 10- and 14-day triple therapy regimens. No treatment-emergent adverse events were observed at significantly higher rates with triple therapy than with any dual therapy regimen.

Dual Therapy: PREVACID/amoxicillin

The most frequently reported adverse events for patients who received PREVACID t.i.d. plus amoxicillin i.i.d. dual therapy were diarrhea (8%) and headache (7%). No treatment-emergent adverse events were observed at significantly higher rates with PREVACID t.i.d. plus amoxicillin i.i.d. dual therapy than with PREVACID alone.

For more information on adverse reactions with amoxicillin or clarithromycin, refer to their package inserts, ADVERSE REACTIONS sections.

Laboratory Values

The following changes in laboratory parameters for lansoprazole were reported as adverse events:

Abnormal liver function tests, increased SGOT (AST), increased SGPT (ALT), increased creatinine, increased alkaline phosphatase, increased globulins, increased GGTP, increased/decreased/abnormal WBC, abnormal AG ratio, abnormal RBC, bilirubinemia, eosinophilia, hyperlipemia, increased/decreased electrolytes, increased/decreased cholesterol, increased glucocorticoids, increased LDH, increased/decreased/abnormal platelets, and increased gastrin levels. Additional isolated laboratory abnormalities were reported.

In the placebo controlled studies, when SGOT (AST) and SGPT (ALT) lansoprazole patients had enzyme elevations greater than three times the upper limit of normal range at the final treatment visit. None of these patients reported jaundice at any time during the study.

In clinical trials using combination therapy with PREVACID plus amoxicillin and clarithromycin, and PREVACID plus amoxicillin, no increased laboratory abnormalities particular to these drug combinations were observed.

For more information on laboratory value changes with amoxicillin or clarithromycin, refer to their package inserts, ADVERSE REACTIONS section.

OVERDOSAGE

Oral doses up to 5000 mg/kg in rats (approximately 1300 times the recommended human dose based on body surface area) and mice (about 675.7 times the recommended human dose based on body surface area) did not produce deaths or any clinical signs.

Lansoprazole is not removed from the circulation by hemodialysis. In one reported case of overdose, the patient consumed 600 mg of lansoprazole with no adverse reaction.



Manufactured by
TAP Pharmaceuticals Inc.
Lake Forest, IL 60045

ENSURE® is a registered trademark of Abbott Laboratories.
V-8® is a registered trademark of the Campbell Soup Company.

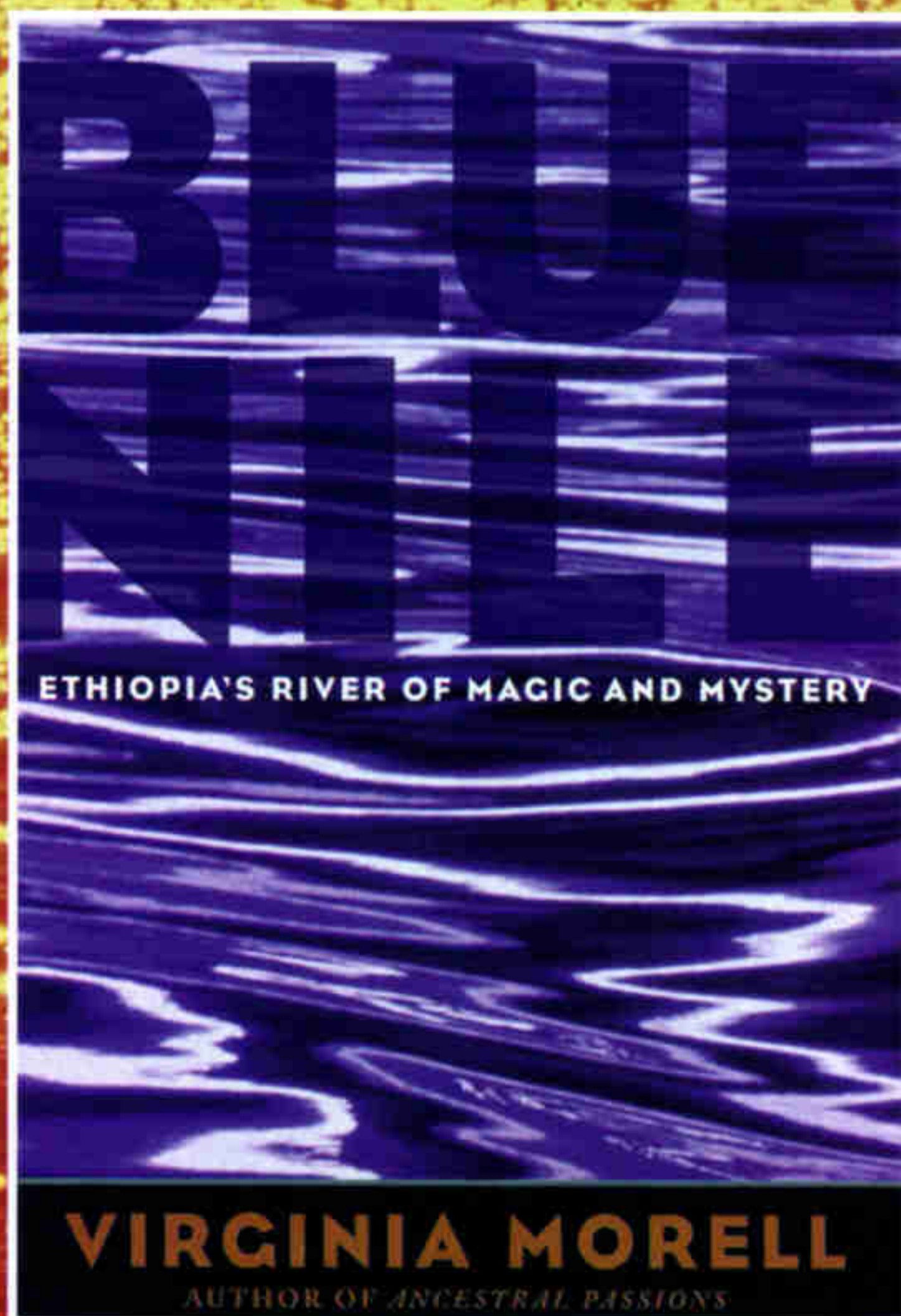
Ref. 03-5073-R15, Rev. November, 2000

© 1995 - 2000 TAP Pharmaceutical Products Inc.

For more detailed information, see Full Prescribing information or contact TAP Medical Services at 1-800-478-9526.

MR-030-009

A river as mysterious as its name.
As deep as its danger.
As relentless as the women who challenged it.



0-7922-7951-4

Ancient, mysterious, romantic, savage. One of the world's mightiest and least-explored rivers gives up its secrets to two adventurous women, determined to travel its entire length by raft—an unbroken journey never before accomplished. Follow their exploits as they face deadly crocodiles, treacherous rapids, and warring factions... just for starters.

\$26.00 / 336 pages / 16 pages of full-color photographs

NATIONAL
GEOGRAPHIC



ADVENTURE
PRESS

To order, call 1-888-647-6733 or visit www.nationalgeographic.com/books/
Available wherever books are sold



Photographed by Richard Glor

WILDLIFE AS CANON SEES IT

Cochran's dwarf gecko had not been seen by biologists for over 20 years until its rediscovery in 1997. On the hilltops, or mogotes, of Los Haitises National Park, this tiny gecko was found living among bromeliads, rainforest plants that have remained abundant on the undisturbed mogotes. The gecko hides between the leaves, and feeds on the nearly microscopic invertebrates also living amid this miniature ecosystem. The relative inaccessibility of the hilltop terrain has preserved these forest patches from agriculture, logging and human disturbance.

Continued protection of the gecko's forest habitat is vital to its future survival.

As a global corporation committed to social and environmental concerns, we join in worldwide efforts to promote greater awareness of endangered species for the benefit of future generations.



Cochran's Dwarf Gecko
(*Sphaerodactylus cochranae*)
Size: Length, including tail, 62 mm
Weight: 0.8 g
Habitat: Tropical forest of the karstic Los Haitises region in the Dominican Republic
Surviving number: Unknown; an endemic species with a highly restricted distribution

Ask Us

THE ANSWER PLACE

Our Research Correspondence staff responds to questions from curious readers.

Q What language do residents of Greenland speak?

A Danish is widely spoken and is taught in Greenland's schools, but Greenlandic, an Inuit language, is the predominant tongue.

Q What is Earth's speed as it travels around the sun?

A The Earth and all of us on it are speeding around the sun at the rate of 67,000 miles an hour.

Q I've heard that tightrope walking is the national pastime of Uzbekistan. True?

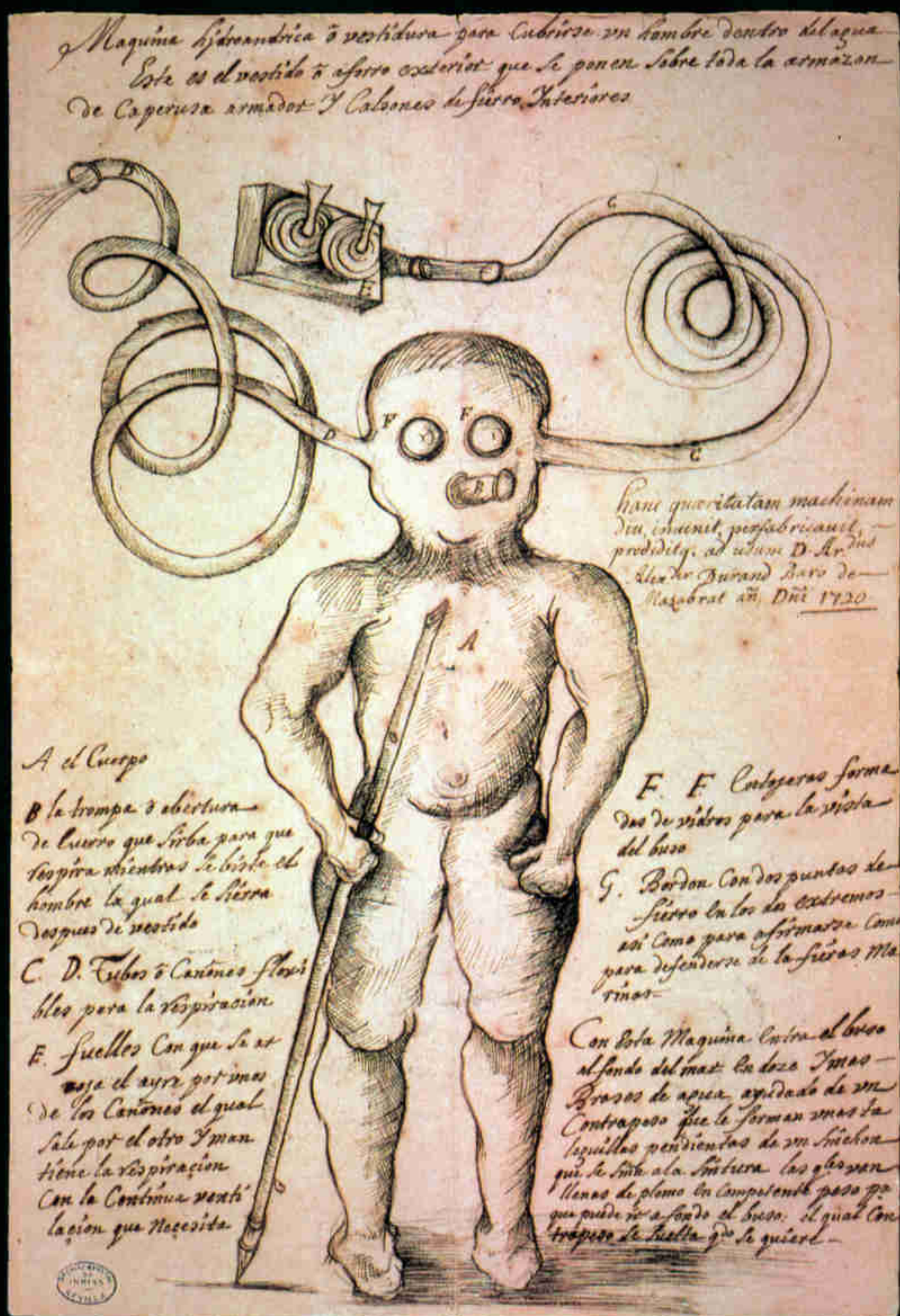
A There's nothing official about it, but tightrope walking is an old and honorable tradition in this Central Asian nation, where ropewalkers perform on market days and special occasions. National championships are held in the capital, Tashkent.

Q How fast can a common housefly fly?

A The housefly (*Musca domestica*) averages 4.5 miles an hour. Its wings beat some 200 times a second.

MORE INFORMATION

Send questions to Ask Us, National Geographic Magazine, PO Box 96095, Washington, DC 20090-6095 or via the Internet to askus@nationalgeographic.com. Include name, address, and daytime phone number.

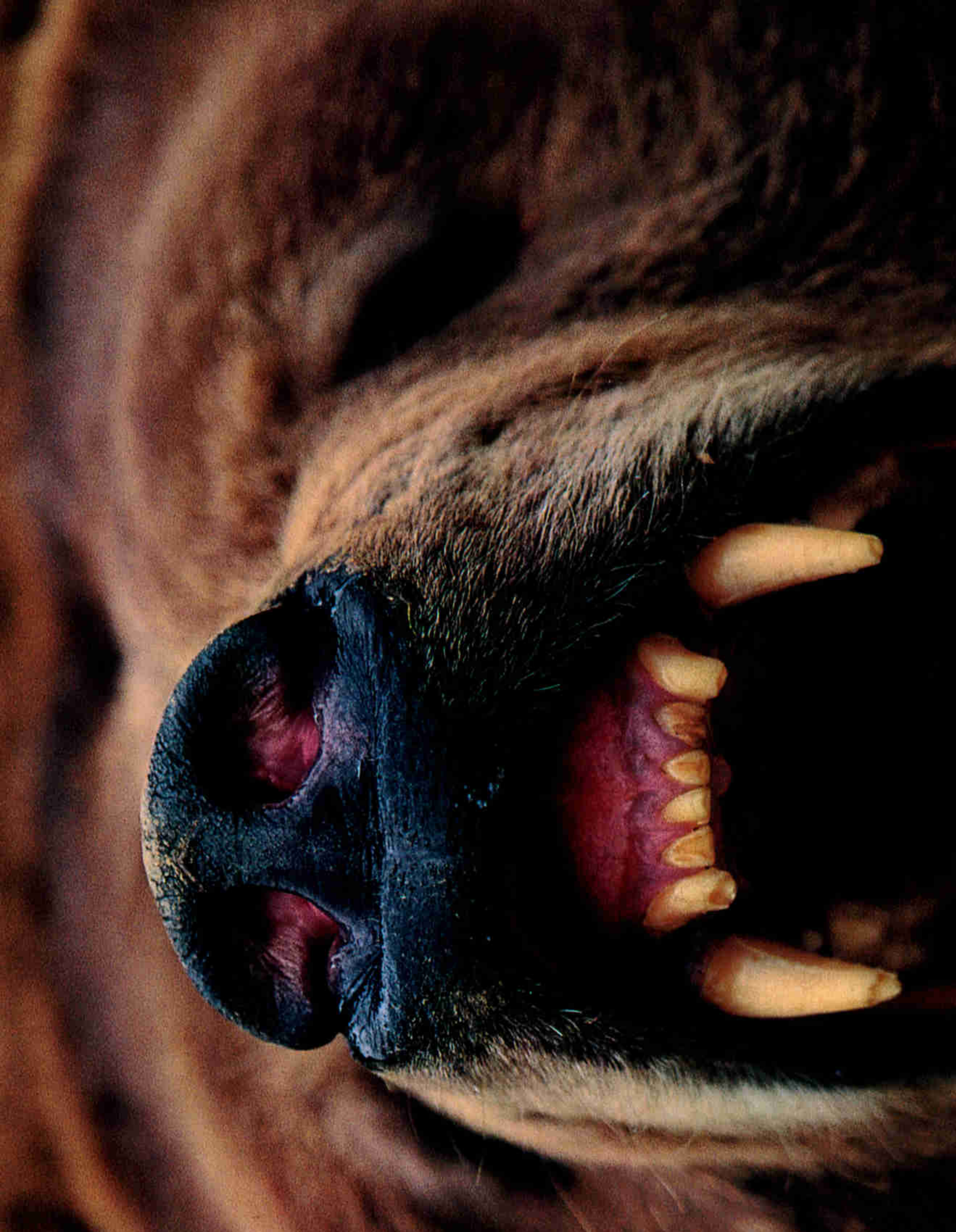


TELL US

For what strange realm was this suit designed in the 1700s?

Think you know the answer? Go online to nationalgeographic.com/ngm/tellus/0107 and test yourself, or read it here in next month's issue.

June Answer If you see this "Signpost Forest," you must be in Watson Lake, Yukon, where visitors post their hometown names. The first sign was nailed up during construction of the Alaska Highway in 1942. Today the signs number some 44,000.



SURVIVAL: THEIR FATE IS IN OUR HANDS

BY DOUGLAS H. CHADWICK
PHOTOGRAPHS BY JOEL SARTORE

Don't be afraid. Brody the trained bear opens wide on command. It's a useful trick—many clients want Brody to play the bad guy. Nearly a century after we reduced their range by 98 percent in the lower 48, humans and grizzlies still have a prickly love-hate relationship.



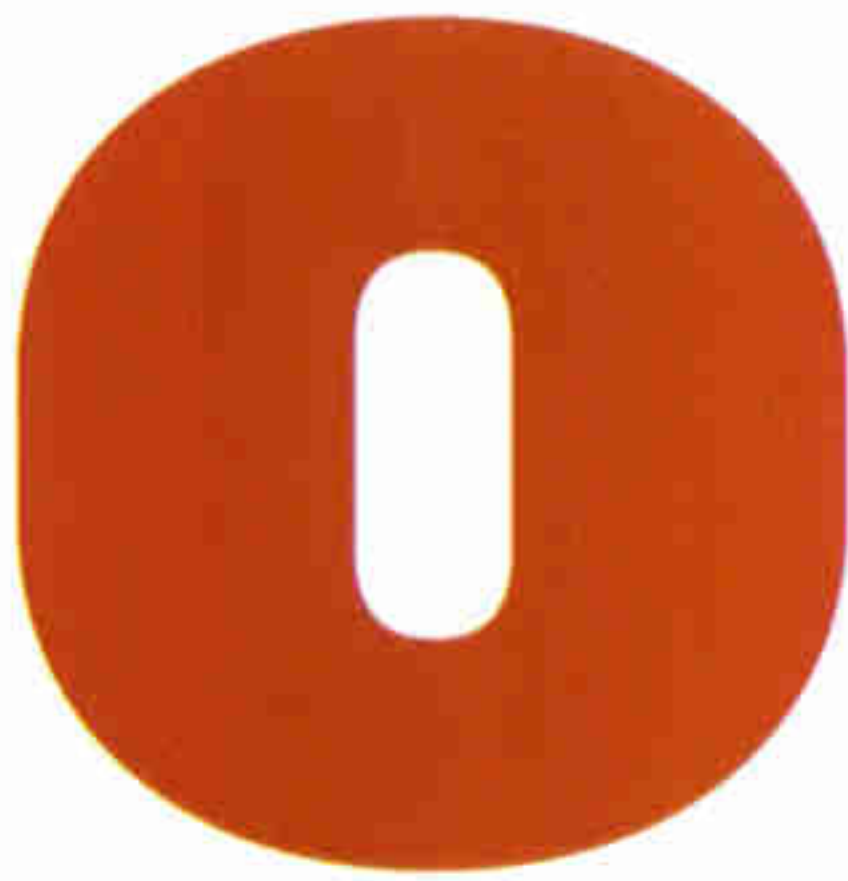
Grizzly

"When I put on the mask, I become the bear," says George Taylor at his Vancouver Island home. He and his wife, Melanie, run Le-La-La Dancers, a Native American troupe. "Grizzly bears represent the strength and power of the woods. I want future generations to see them."



NATIVE DANCERS KEEP THE GRIZZLY'S SPIRIT ALIVE





IN THE MOUNTAINOUS COAST of southern British Columbia, autumn salmon are running up the Glendale Creek to spawn. Wading among them is a grizzly bear gold as poplar leaves. Silver fur rings its shoulders and chest. The coat is so unlike the uniform dark brown of most coastal grizzlies that the scientists studying bears here named this yearling male Panda.

“If you ask me, he’s spoiled rotten,” says Chris Bright, one of the researchers. “Watch.”



CROWDS PACK an observation platform at Brooks Falls in Alaska’s Katmai National Park and Preserve, where bears catch salmon and more than 200 visitors a day learn about bears. “It’s industrial-strength tourism,” says researcher Barrie Gilbert, “but people keep to one place, so the bears have adjusted.”

Although Panda is already a 150-pound predator, he seldom bothers chasing a fish himself. He waits for his mother to grab one and sidles over to take it from her mouth. He even rubs his plump, itchy, wet butt against her while he eats her catch, then tries to nurse. But mother is busy lifting a thrashing salmon by its belly. As eggs squirt out in a pink arc, Panda mooches that fish too. Finished, he ambles into deeper water, where he suddenly lights into dear old mom with play swipes of his paws.

The pair wrestle across a chest-high pool. They growl and bat at each other and whap the surface. Panda gets so worked up that he breaks

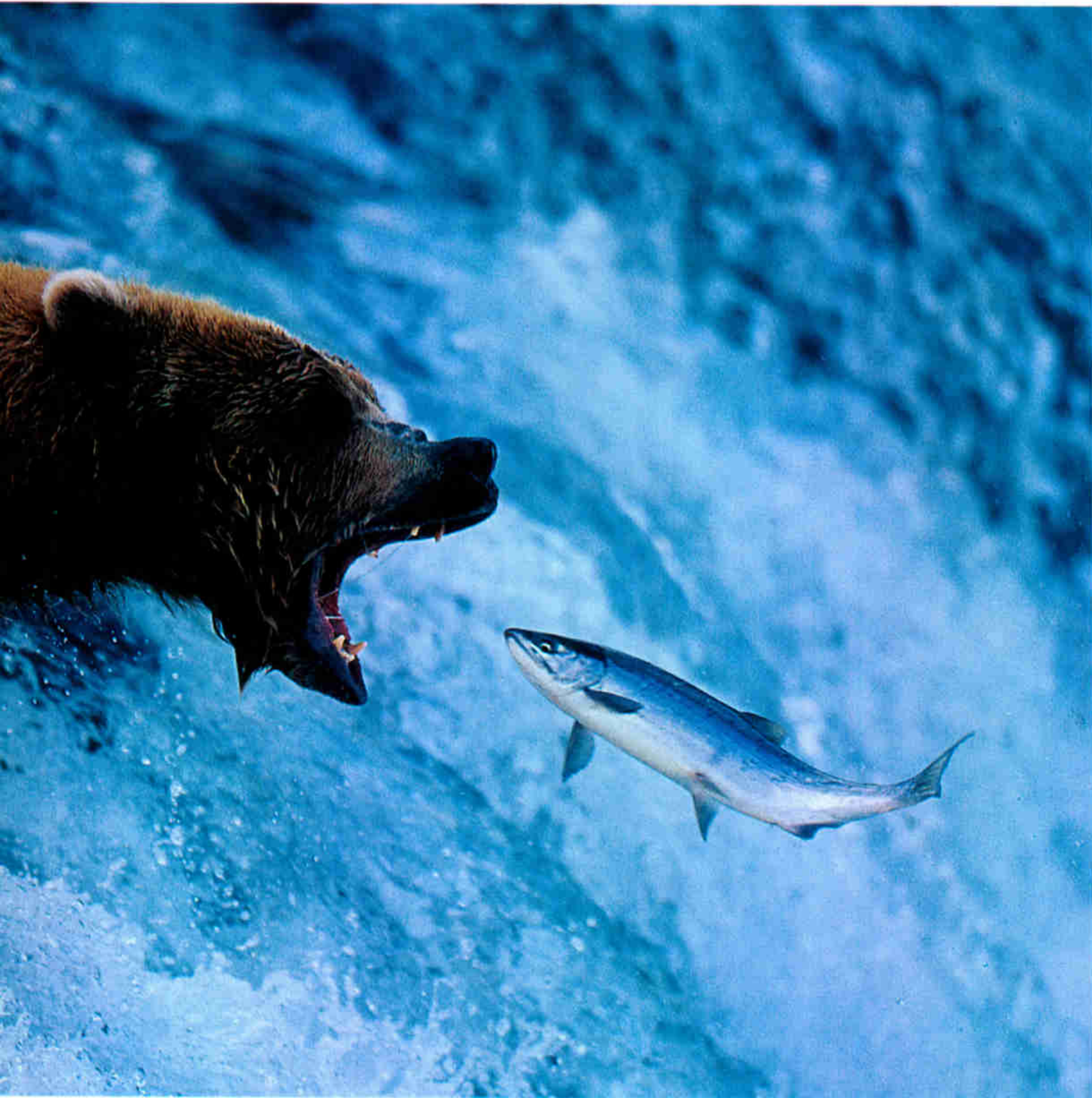


into a dance. He flattens his ears and swings his head, shimmy-shakes and shadowboxes. He bites his paws. He dashes and leaps and does pudgy pirouettes.

Panda isn't really spoiled or goofy; he's just a young grizz in salmon time. But then grizzlies come in all kinds of moods. Once, my teenage son, Russell, was sitting with his back to the pen of a 750-pound male captive bear named Tank, talking to the grizzly while idly chucking gravel at a can. Hearing scraping sounds behind him, he turned to find that Tank had swept together the odd bits of gravel on the pen's floor and was pushing a small pile out to him under the bottom bar with a paw.

When a tour leader on the Glendale Creek reports hearing a bear bawling upstream, I go investigate with four others, including Barrie Gilbert of Utah State University, an authority on bear behavior. In his 60s, he is ruggedly handsome, with an emphasis on rugged after he ran into a grizzly that rearranged one side of his face. We're afoot on the floodplain when we hear a bear crashing through water. It must be racing after salmon.

Wrong. The next crashing is of brush, then comes snorting, and I see a broad mound of fur hurtling darkly at us and hear myself yell, "HEY-BEAR-NO!" In a heart squeeze this hulk is 15 yards away, maybe, I don't know, only that





it has paused, chuffing and popping its jaws, and I'm unholstering spray canisters of red pepper deterrent, and Gilbert is looking at me out of his remaining eye, saying we should keep in a tight group. Well, that would be just fine by me. The bear then disappears, which is all we learn about that one.

GRIZZLIES set off such a range of emotions, from ooh-snoogie-woogums to God-save-us, that it is almost impossible to see these creatures clearly. Yet their future depends largely upon whether we can.

Brown bears, *Ursus arctos*, are distributed around the Northern Hemisphere. In North America some scientists distinguish between the big brown bears of Alaska's Kodiak archipelago, those along the mainland coast, and the more grizzled types found inland. More often than not, people use the name grizzly for all of this continent's brown bears.

There are only about 58,000 left, more than half in Alaska. As many as twice that number lived in the lower 48 two centuries ago. By 1975 those were reduced to fewer than a thousand and listed as threatened. Numbers in some areas appear to have stabilized and may even be rebounding slightly, bringing the total back up to about 1,100. Meanwhile, Canada's bears

are feeling the effects of liberal hunting quotas, tough policies toward nuisance animals, and backcountry development that has fragmented habitats and isolated populations—the same combination that put lower 48 grizzlies on the imperiled list.

Beyond not being killed, the bears' main requirements are lots of room and lots of food. What do they eat? Whatever they must to live on stored fat up to half the year while hibernating in a den. Whatever they learn is possible. And when you combine pile driver strength and four-inch claws with a talent for finagling, the possibilities stretch from elk to hornet larvae, from the roots and bulbs cached in pocket gopher burrows to the pocket gophers themselves, from a horse to the grain pellets put out for it, from clams to another grizzly.

Along a spur of Wyoming's Absaroka Range in the 9,500-square-mile greater Yellowstone ecosystem, I pitch camp at 8,000 feet with an ecologist, Hillary Robison, and her two assistants, Jason Hicks and Chris McQueary. The next day we climb toward a 12,000-foot summit. On a talus slope below it the team sets up a trap for army cutworm moths, strong fliers with abdomens the size of jelly beans.

After hiding in crevices among the stones by day, the moths wing out each night to sip the nectar of alpine wildflowers. The rest of their

life cycle takes place on prairies, possibly as far away as Nebraska. By analyzing DNA from specimens, Robison hopes to pinpoint those locales, for reasons I soon learn. She hands me what looks like a chunk of glazed pottery found near the trap. Consisting of countless hard little legs compressed with shiny wing parts, it is—thanks very much—grizzly dung.

“When the moths arrive in the high country during late June or early July, about 40 percent of their body weight is fat,” she says. “By late August that has increased to 72 percent. They become the richest food in the ecosystem, with more calories per gram than elk or deer meat.” The insects congregate at dozens of lofty Yellowstone sites, where grizzlies roll the rock

rubble to get at them. Similar moth assemblies occur high in Montana and possibly Canada.

Over the winter a large bear can lose 150 pounds, which needs to be replaced. Size and body fat affect how many cubs a female produces. For males, getting big means competing more successfully for mates. Observers have calculated that a silvertip can eat 2,500 moths an hour and 40,000 a day. A month of such steady feasting could fulfill nearly half the bear’s energy requirements for the year. Not every area is that loaded with winged nougats, but the hot spots resemble a salmon stream, with as many as 23 grizzlies foraging together.

Before Hicks and McQueary joined Robison, they were stringing lengths of barbed wire along streams flowing into Yellowstone Lake. More than 60 serve as cutthroat trout spawning areas. DNA from hairs snagged by the barbs has told of at least 80 grizzlies homing in on the fish. This is important to know because some lunthead, who presumably wanted bigger fish to fry, dumped non-native

CROSSING TO SAFETY?

Hunting, trapping, and habitat loss have confined North America’s grizzlies to Canada, Alaska, and isolated pockets in the U.S. Northwest. Grizzlies roam huge home ranges but are reluctant to cross busy highways. Wildlife overpasses (left) in Alberta have been used by a handful of bears.





A YOUNG GRIZZ IN SALMON TIME

A bear walks by
Katmai's Naknek
Lake toward the
Brooks River for
a day of fishing.
Brown bears roam
enormous home
ranges—up to a
thousand square
miles. Where food
is plentiful, such as
salmon-rich Kat-
mai, ranges shrink.



trout into the lake. They keep to the open water, out of grizzly reach, and are gobbling up the cutthroats. When people set out to conserve grizzlies, how many imagined it would mean worrying about the chemicals sprayed on moth larvae in distant prairies, netting exotic fish, and talking with rural homeowners?

HALFWAY BETWEEN Yellowstone National Park and Cody, Wyoming, Curt Bales invites me into the main house at the ranch he manages, points to the low ceiling, and says, “The former owner wasn’t a very tall guy.” That would be William F. Cody, the hunter nicknamed Buffalo Bill. “Five years ago

he promises that any bear acting overly bold will be trapped and relocated.

This kind of public relations patrolling calms nervous trigger fingers. Not that Brusino won’t get an earful about bear bureaucrats when chicken coops do get smashed. And when he disposes of an incorrigible bear? “My mom gives me a hard time,” he says. “You know the most dangerous animal in the Yellowstone region, don’t you? It kills, maims, kicks half to death, rolls on, and bites more people around here than anything else.” The horse, of course.

Each year during the 1990s grizzlies injured an average of only seven humans and killed two. Still, no bigger, tougher, more storied predator ever roamed the American West,

THE KILL: A grizzly runs down a bison calf in Yellowstone National Park, a behavior rarely caught on film. Yellowstone’s grizzlies eat mostly plants and insects, but recent research suggests that the meat of hoofed mammals provides up to 70 percent of males’ energy.

we had a grizzly out at our cow camp, breaking in,” Bales recalls. “It got flour and sugar. Got into a whiskey bottle too. And right beside that was an empty aspirin bottle. Makes you wonder.”

With grizzlies, you have to. A hunting guide in Alaska told of watching a male strip bark off willow shrubs, which the bears aren’t known to eat. After a client shot the animal, the guide noticed that it had a busted tooth. The abscessed area was packed with willow bark, a source of salicylic acid, better known as aspirin.

“Got a grizzly on the place now,” Bales says. “About 250 pounds. Been here two weeks and keeps to the river brush. I see it pretty near daily.” It was one of 15 roaming the South Fork of the Shoshone River countryside last spring. Right after picking up one of his children from fishing, Bales spotted a female with two cubs among willows the child had passed through. “That was the last time my kids went out and did anything by themselves,” he says. “It definitely changed our way of living out here.”

Mark Brusino, the Wyoming Game and Fish Department’s bear management officer, has stopped by to check the situation. On his rounds through Cody’s new suburbs and out to the larger spreads, Brusino urges patience until the high country greens up and elk have their calves. Most grizzlies start heading back to the mountainsides then. Reminding folks to store their refuse and animal feed out of reach,



and here it is—fussed over even in cowboy territory. This would plumb befuddle Buffalo Bill. Silvertips are being seen out past Cody, snuffling next to prairie dogs in the sagebrush hills past Meeteetse, taking up new lives in Grand Teton National Park to the south, and probing beyond. “What are we going to do if grizzlies colonize the Wyoming Range with 40,000 sheep on public land grazing allotments?” Bruscano asks. “It’s going to be chaos. It’s going to be political torture on a daily basis for game managers.”

Everybody seems a little confused about just what to do next, because no generation ever allowed even a modest upswing in grizzlies before. Some states are already developing management plans for the time when Yellowstone bears will have recovered enough to be taken off the endangered species list. Defining recovery is trickiest where people are also

increasing, and the population of the greater Yellowstone region is projected to double within two or three decades.

Ask anyone in the West where the boundaries for grizzly protection ought to be drawn, and you get opinions about predators, property rights, public lands, resource development, environmental laws, guns, and man’s rightful place on the planet. Within a year or two the U.S. Fish and Wildlife Service hopes to reintroduce grizzlies to a wilderness area within the 25,000-square-mile Bitterroot ecosystem. Sprawling from Montana’s western edge into central Idaho, one of the largest blocks of remote U.S. backcountry outside Alaska last saw silvertips in the 1940s. Re-grizzled, it should not only increase numbers but foster vital connections between other populations.

But opening a local newspaper, I find a letter to the editor warning that if grizzlies are





OPPORTUNIST: Bears won't turn down easy meals, from beached whales to trash. Folks in Deadhorse, Alaska, love "Kate" (right), but looking for food near humans may get her cubs killed one day. Hunting bears is forbidden here; as they roam, the cubs won't be so lucky.

reintroduced, "Deaths will occur! . . . disfigurements, dismemberings. . . . I don't want grizzlies in my backyard any more than they [bear advocates] would want convicted, child-molesting repeat sex offenders in theirs."

In January Idaho's governor sued to stop the federal plan cold.

CLIMBING an October mountainside in Montana's Glacier National Park, I notice a grizzly about the same time it notices me. Easing away, I circle far above. Now the backdrop is of ice fields and limestone ramparts with lakes cupped at their base and clouds surging over their top, driving 50-mile-an-hour gusts before them. They clout me around and start hurling rain. It turns to snow that races bands of storm light from crag to crag. The scene is so immense I am hardly aware that the bear has been zigzagging uphill my way as it feeds.

It begins eyeing me—a sidelong check now and then. It's enough to make me suddenly remember how many of my footsteps to get here landed in craters. Digging for roots nonstop as

den-up time nears, this creature has torn half the face off a mountain. One more glance from the bear, with the wind and my pulse roaring louder in my ears, and I veer down toward timberline, on bear-raked soil all the way.

Grizzlies are the main animal earthmovers in Glacier's high country and across many a lower meadow and floodplain. Where their claws recontour the ground, they plant seeds and release scarce nitrogen from lower soil levels. Vegetation such as glacier lilies grows better and produces more seeds in swaths dug by bears, which can also eat and spread seeds from as many as 70,000 berries a day. You could view grizzlies as heavyweight gardeners, ecosystem accelerators—the epitome of a keystone species. Or, like Karl Rappold, who ranches on the Rocky Mountain Front southeast of Glacier, you could pay more attention to the warm-blooded things they gnaw.

"I watched one picking up the remains of a cow carcass and slamming it down on the ground like a professional wrestler," he says. "I couldn't figure it out until I saw it was breaking bones to get at the marrow." Yet since 1969 these predators have taken precisely one

animal from his herds. The cow being body slammed was a victim of lightning, disease, or old age. On average fewer than 50 cattle killings by grizzlies are recorded in the lower 48 each year, and the culprits usually wind up relocated or put down. Bears that include pastureslands in their range without conflict—and Rappold has grizzlies that use his mineral lick side by side with the cows—can take advantage of a richer array of foods than they could if confined to the higher elevations of mountain terrain. Improved nutrition would explain why Rappold sees females with three and even four cubs on the Front, whereas the average litter size for grizzlies is closer to two.

Together with Glacier Park, the Bob Marshall Wilderness complex, neighboring national forests, and tribal and state lands, the Front is part of the 9,600-square-mile northern Continental Divide ecosystem, which contains an estimated 400 to 500 grizzlies. Although biologists have a hunch that the population is growing, they are reluctant to declare an increase without more complete surveys. That

the bears are roaming all kinds of new acreage, none would deny. “When one rancher called about a problem bear, and I went to set a foot snare,” says Dan Carney, of the Blackfoot Tribal Fish and Wildlife Department, “I was so far out on the plains I couldn’t find a tree anywhere to anchor the cable to.”

A SNARED grizzly waits among hemlock trees in the Selkirk Mountains of far northern Idaho. It has turned them to matchsticks. The place looks like a bomb went off, and this is only a two-year-old. A much scarier force, its mother, is nearby. I’m to pinpoint the radio signal from the collar she wears, while Greg Johnson, an Idaho Department of Fish and Game conservation officer, and his assistant, Josh Stanley, sedate the young bear to give it a radio collar of its own.

Tracking this third enclave of lower 48 grizzlies reveals that they, too, are exploring a little farther out from the mountains’ core all the time. But, says Idaho Fish and Game’s





“PAY THE INSURANCE, BECAUSE NO ONE SHOT KILLS”



Knight's Taxidermy of Anchorage processes more than 200 brown bears a year, about one-sixth of the annual Alaska take. Most are shot by out-of-state hunters. "We don't see any negative impact," says owner Russ Knight. "There's plenty of bears here."

grizzly researcher Wayne Wakkinen, "While we feel the population is increasing slowly, this is a group of only 40 to 60 animals." And at any given time, half are likely to be in the British Columbia portion of the Selkirk range. The 1,200-square-mile grizzly ecosystem on the U.S. side is mostly national forest. Decades of logging have left it crosshatched with roads. After silvertips were listed as threatened, poachers and mistaken black bear hunters continued to take an insupportable toll. That dropped off after the Forest Service began limiting some road access with gates for part of the year.

"I'm convinced that saving bears is not a biological problem; we could grow them out our ears," Johnson says, removing his coat from under the reviving two-year-old's head. "It's a human perception problem. You have people



GRIZZLIES KILLED only one person last year. Max Tylee almost made it two when a startled bear bit his head in British Columbia. Encounters usually end up worse for bears. Authorities killed a Montana grizzly after it broke into one too many homes. The Wind River Bear Institute's Karelian bear dogs, a fearless breed used to chase away problem bears, sniff its body.

who think bloodthirsty grizzlies wait behind every bush to jump out and eat them. Then you have ones who associate the bears with everything they don't like about regulations. If we can pull off grizzly recovery in the Selkirks, it will mean we can do it anywhere."

How about in the last two of the five lower 48 enclaves? East of the Selkirks, the grizzlies of Idaho and Montana's 2,600-square-mile Cabinet-Yaak ecosystem, laid low by past hunting and roadbuilding for timber, have dwindled to perhaps 30 animals. Washington's 10,000-square-mile North Cascades ecosystem may hold five to ten. Such figures might not

be critical if Canada were the boundless supply house of the wild and woolly that many Americans imagine. In reality, southernmost B.C. and Alberta are changing fast. As Chris Servheen, grizzly bear recovery coordinator for the U.S. Fish and Wildlife Service, says, "The ultimate worry is that the whole lower 48 grizzly population will become isolated"—making it less resilient to disruptions and vulnerable to inbreeding.

Traveling through the heart of Banff National Park in Alberta, watching ice-honed escarpments *take over the sky*, I have the same impression most visitors do of an ultimate



Rocky Mountain stronghold. Yet it has less than a quarter as many grizzlies as Yellowstone National Park, despite being nearly as big. All that soaring grandeur may feed the spirit but won't fatten a bear. The average female grizzly in Banff weighs 200 to 250 pounds—not even up to pro-football lineman standards—and produces cubs four years apart, compared with every three years for a female on prime range.

The reserve's richest habitats are down in its central drainage, the Bow Valley. But that is where the park's lodges, golf courses, and ski complexes are concentrated—and where, during the summer, an average of 21,000 vehicles a day race along Highway 1, the main Trans-Canada route.

"Bears are a full range of personalities, from Mary Poppins to Charles Manson," observes Mike Gibeau, a Banff-area biologist. "Some

won't go anywhere near the valley. Others are quite willing to live with people." But park managers move them out.

Only a few Banff females have been recorded crossing the Trans-Canada four-lane. "You have a long, thin peninsula of bears coming down from the north into the U.S.," Mike continues. "In Alberta it starts to narrow 200 miles north of the border. This is a pinch point. The next place you'll see grizzlies go on the brink is near the U.S. line. We look south and wish we had as good a grizzly population as you do."

The 20th century pared grizzlies in the vast province of Alberta from 6,000 to around 700, and while British Columbia officials claim to have 10,000 to 13,000, skeptics say the true figure might be more like 5,000. Since 1975 biologists have radio collared more than 385 grizzlies from northern Montana to Alberta's

Jasper National Park, north of Banff. More than a hundred were adult males, and of the 24 that died, all were killed by hunters, poachers, wildlife managers getting rid of problem bears, or some other human cause. This is partly the price of having immense home ranges. Where a female grizzly in the Rockies typically occupies 50 to 300 square miles, a male will cover 200 to 500 and occasionally 1,000. This increases its odds of bumping into trouble, especially where grizzlies are legal game.

AT KNIGHT INLET, in the heart of B.C.'s coastal grizzly range, I meet a big, boisterous bear of a tourist-lodge owner named Dean Wyatt, who says, "I bring in 1,600 people a year. This single bear-watching operation generates as much revenue as all the grizzly hunting in the province. Yet in ten days, there'll be a guide here with someone trying to shoot bears."

If B.C.'s estimates of grizzly numbers are too high, the annual harvest is too heavy—perhaps

10 percent of the population. The government recently announced a three-year hunting ban to get a definitive count. Until the count is complete, no one has a very clear idea of how many grizzlies inhabit the province, particularly the salmon-rich coastal forests. But there is suddenly more interest in the possible effects of disturbances on the coastal bears since scientists became aware of what some call salmon trees. As the fish run upstream, transporting tons of nutrients harvested from the seas, grizzlies carry that bounty on across the forest floor in the form of urine, feces, and left-over carcasses. Nitrogen, crucial for growth, is limited in northern forests. The bears deposit 10 to 25 percent of the total available to plants that are within a quarter of a mile of salmon stream banks, and some trees grow more than 60 percent faster. Over the centuries grizzlies, in another keystone role, help fashion temperate rain forests with their giant conifers and their ability to produce more biomass per acre than tropical rain forests.

In Alaska sportsmen annually take between





“THEY’RE SO INTELLIGENT,” says trainer Ruth LaBarge (above) of film and TV veterans Barney (standing for a jelly reward) and Whopper (impressing a Scout). Her bears know more than 50 commands. LaBarge’s bittersweet dream: to set aside land for brown bears so Californians can get a feel for the life of their state animal, last seen in the wild here in the 1920s.

1,000 and 1,600 of the state’s estimated 32,000 brown bears—5 percent or less. This is considered sustainable by game biologists, though the long-term genetic consequences of taking the biggest trophy specimens are unclear. About half to two-thirds fall to out-of-state and foreign shooters.

I’m leaning on an African lion next to several stuffed bears in Knight’s Taxidermy studio in Anchorage while Fred Cook, a guide specializing in bear hunts, describes the job.

“Forget the head shot; I’ve seen bullets bounce right off the skull,” he says. “Not the heart, either; it’s a fibrous muscle and still 50 percent effective with a hole in it. You want to break bone in the legs or spine; anchor the bear right there. Otherwise, once he’s wounded and jumping around, and you’re excited too, that’s when things go to hell in a hurry. I tell my clients, ‘Don’t quit shooting until I tell you. Pay the insurance, because no one shot kills.’”

Cook takes pride in getting hunters close to their quarry. “I want to be where the bear has a chance to hit back,” he says. “The idea is to

purposefully place one’s self in harm’s way. Find out what’s in a man.”

Saturated with spawning salmon, parts of the Alaska Peninsula, where Cook hunts, can support 1,500 bears in 1,000 square miles. An area the same size on Alaska’s North Slope might hold four or five bears. Driving the pipeline road that direction, Dick Shideler, of the Alaska Department of Fish and Game, admits, “Frankly, the home ranges of some males up here are so huge, I can’t even pin them down.”

The first bear we find is a dark-footed, gilded one nosing among the tundra hummocks like a wolverine. It is after bird nests and small rodents, and it bounces up and down on its forelegs to flush out hidiers. “Our key bear food here,” Shideler says, “is arctic ground squirrels.” They grow roly-poly on tundra herbs, and grizzlies convert that fat to their own.

As we reach the town of Deadhorse under a midnight sun, Mary appears. This bear is four years old, weighs 375 pounds, and is coming rump-first out of a trash bin, a blue ear tag tucked like a plastic flower into slightly frowsy, blond hair. Strolling to some plywood stacked

Night fishing?
No problem. This resourceful Alaska bear felt for salmon with its feet, then dived to catch them. Salmon help coastal bears grow larger than inland cousins; droppings, urine, and leftover fish scraps help fertilize nearby forests.

A large black bear is shown in profile, sitting on a log and eating a salmon. The scene is set at night, with a dark, starry sky in the background. The bear's fur is black, and the salmon is a vibrant orange-red color. The water is dark and reflects some light.

MAIN REQUIREMENTS: LOTS OF ROOM AND LOTS OF FOOD





between metal Quonset huts, she breaks a few sheets, rolls pipes from a pile—you never know what might scurry out—then dives into a “bearproof” bin left open behind a store.

A bear named Annie used to climb three stories up a building’s fire escape to snooze, away from the mosquitoes. When Shideler tranquilized Annie as a yearling at the Prudhoe Bay landfill to radio tag her, her brother, Toby, edged over and dragged his sister away from the biologist, then sat at her side as if on guard.

No guns are allowed in the oil field area, mainly for security reasons. Besides, watching the local bears is a favorite entertainment.

So human-grizzly relations remain fairly congenial. Nevertheless, Shideler worked hard with oil company and local officials to wean the bears from garbage by bearproofing more garbage bins and fencing off the dump.

The issue is safety, and not just for people. Associating humans with food can doom grizzlies. On average roughly three-fourths of cubs survive under natural conditions. Inside the oil patch the rate is higher, but it plunges toward zero once bears head out on their own and are drawn to camps, hunters’ bivouacs, and native villages.

Whether at the far, frozen end of the continent or in a Wyoming

MORE ON OUR WEBSITE

Watch an interview with Joel Sartore and learn about the dangers of photographing grizzlies at nationalgeographic.com/ngm/0107.



DO NOT DISTURB. A bear dozes after fishing in Katmai, home of one of the world's largest protected populations. Life isn't so tranquil in the lower 48 and southern Canada, where bears are being squeezed out by humans. The brown bear needs space, and there isn't much left.

subdivision, grizzlies are going to tell us where the food calories are concentrated. In 1998, when the berries failed on northwest Montana's mountainsides, the bears headed for town. Tim Manley, from the Montana Department of Fish, Wildlife, and Parks; Carrie Hunt, of the Wind River Bear Institute; and her Karelian bear dogs, bred to hunt brown bears, were roaring from crisis to crisis, trying, in Hunt's words, "to make it easy for a grizzly to do the right thing and uncomfortable for it to do the wrong thing. We use the bears' learning abilities to

teach them about how to behave near people."

Joining the chase, I found people learning different behavior as well. When a soft-spoken Montana cowboy and a petite woman with a pack of muscular dogs knock at the door to say, "There's a mother grizzly in your neighborhood, and we thought we'd let you know what we're doing," folks listen up. Many learned that some of the best bear food that hungry fall was the stuff in their bird feeders.

No one ever said that coexisting with grizz would be easy. But in following bears through backyards, I met one homeowner after another who wanted to know how the bears were doing. This level of tolerance, almost unheard of before grizzlies were listed, might just lift them off the list and keep them off.

Stepping across boundaries, grizzlies lead us to do the same. Much as their wide-ranging ways forced managers to look beyond Yellowstone National Park's borders and focus on the greater Yellowstone ecosystem, a still larger view of grizzly needs helped frame the Yellowstone to Yukon (Y2Y) Conservation Initiative. This joint effort by more than 200 U.S. and Canadian organizations aims to secure habitats for all species by keeping core wildlands up and down the Rockies connected. Nearly 20 million acres in northern B.C. have recently been protected as part of the Y2Y vision. On the U.S. side, where grizzly range is more fragmented, possibilities for linking remaining wildlands are being explored with satellite imagery and computer analysis in a merging of high-tech data beamed from space with the old, untamable, earthen muscle of the great bear.

At the Grizzly Discovery Center, a tourist attraction in West Yellowstone, I find four captive bears. Orphaned subadults that would have been destroyed if not given a home somewhere, they are playing mightily, juggling logs and romping in and out of a pool. A family nearby watches the scene together, rapt. "When I grow up, I'd like to be a grizzly bear," announces the youngest boy.

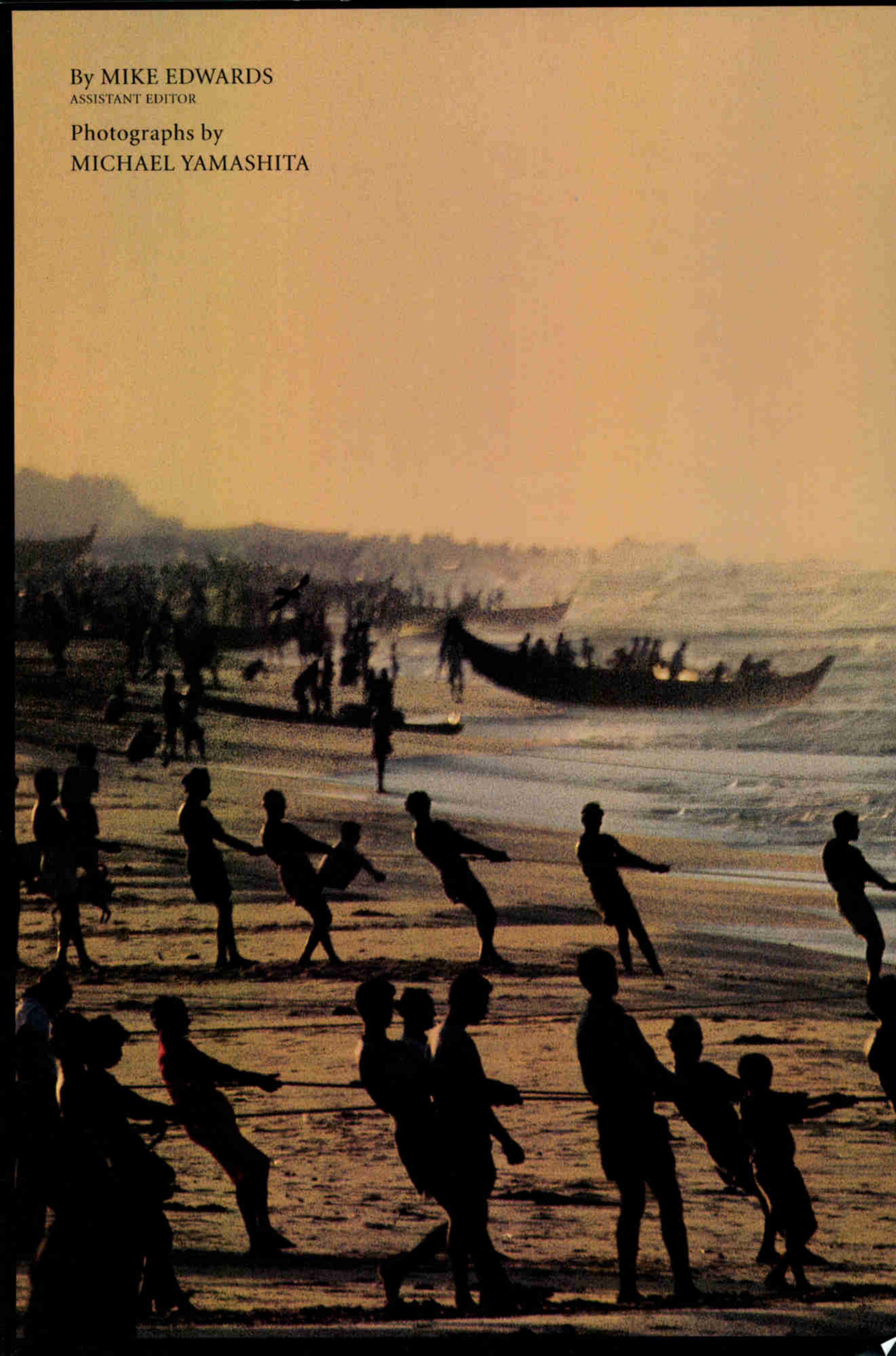
"Why is that, honey?"

"Because then I could do anything I want."

If only. □

By MIKE EDWARDS
ASSISTANT EDITOR

Photographs by
MICHAEL YAMASHITA



MARCO POLO

PART III

JOURNEY HOME

STRENGTH IN NUMBERS ENABLES VILLAGERS TO PULL IN NETS ON THE WEST COAST OF INDIA, WHERE PEOPLE HAVE "ALL THINGS DIFFERENT FROM OURS," WROTE MARCO POLO. ELUDING PIRATES AND CANNIBALS, THE GREAT TRAVELER, HOMEWARD BOUND, UNCOVERED BOTH THE MATERIAL AND THE SPIRITUAL RICHES OF SOUTH ASIA.







BIBLIOTECA COLOMBINA, SEVILLE, SPAIN

“Here . . . begins the Book of Indie.”

Tales of plentiful pearls, exotic spices, and ascetic holy men, like a present-day sadhu (left), appear in pages on India in Marco's book from the late 1290s. The Description of the World. His words may have inspired Christopher Columbus, who wrote notes 200 years later in the margins of a Latin translation (above).

A CLUMSY FLOTILLA of 14 junks rolled through the South China Sea, propelled toward the Equator by the northeast monsoon. These were large ships for their time, a hundred feet long or more, with four masts and oars that took four men to pull. Each raised as many as a dozen sails, probably made of bamboo slats that rasped and clattered in the breeze. Marco Polo was aboard one of these junks, homeward bound with his father, Niccolò, and uncle, Maffeo. The year probably was 1291, perhaps 1292—dates weren't Marco's strong suit. The flotilla must have just crawled as it passed Vietnam, then Singapore, possibly because the junks were having trouble staying together. Marco's book, *The Description of the World*, says it took “quite three months” to reach Sumatra, a landfall that Chinese mariners usually made in about half the time.

After some 17 years in China the Polos were anxious to leave. Marco, only 17 when he set out from Venice, was now about 37, and his father and uncle were nearing 70. Several times, Marco says, they had asked their patron, the Mongol emperor Kublai Khan, to allow them to depart. Kublai demurred, not wanting to part with his Europeans, who were novelties at his court.

The Polos knew Kublai's health was failing and sensed that his regime was losing its grip. So, receiving permission at last, they got out while the getting was good—with the extra satisfaction of getting out rich. Kublai lavished gifts upon them, not only jewels but also two gold tablets the size of a man's hand. These *paitzu* were superpassports that required officials in Mongol domains to provide whatever the Polos needed for travel and comfort.

I have followed more than 6,000 miles of the Polos' great Asian odyssey—

through deserts in Iran and mountains in Afghanistan, to fabled Xanadu and the throbbing cities of China—and I know of the delights of their experience as well as its challenges.* No part of their adventure was more daunting than the voyage from Quanzhou in southern China to Hormuz on the Persian Gulf, a 6,500-mile journey that took more than two years.

Something terrible was ahead—perhaps an epidemic, typhoons, or shipwrecks. Marco refers to this only obliquely, revealing that just 18 of the 600 passengers survived the voyage. Adding insult, the Polos were robbed of some of their China wealth as they traveled beyond Persia on land.

MARCO OFTEN VISITED with the voyage's preeminent passenger, a 17-year-old Mongol princess named Kokejin, known as the Blue Princess because her name meant she was like the sky. She played a role in their liberation, Marco claims, inasmuch as Kublai finally allowed the Polos to leave so they could help escort her to Persia. There she was to become the bride of Kublai's great-nephew, Arghun, Persia's ruler.

Marco also passed the time with sailors, collecting yarns that would galvanize later adventurers. East of China, he wrote, lay a "great island" where people have "gold in very great abundance" and harvest large red pearls. Marco was the first European to write of Cipangu—that is, Japan. His description was well-known to Columbus, who wondered if a distant island he glimpsed in the Caribbean might be Cipangu.

"According to what the good sailors say," Marco continued, there was a great spice-producing island to the south, called Java. And out there too were exactly 7,448 more islands. When European mapmakers began to adopt

*See the first two articles in this series, "The Adventures of Marco Polo" and "Marco Polo in China," in May and June 2001.

*E*scorting a Mongol princess to Persia, Marco and his sailing crew stalled on Sumatra for five months when winds died. Fear of cannibals in the interior pinned them to the beach on a shore where fishermen today use the off-season to burn barnacles off boats.

"We . . . made on land castles of beams and of logs . . ."



Marco's reports, Cipangu, Java, and the other islands (slightly inflated to 7,458) were among the first entries.

As the ships reached Sumatra, Marco reported, "the weather . . . did not let us go our way." The northeast monsoon had died.

I went to the docks at the port of Belawan to ask fishermen about winds. There's always a change in the spring, said a veteran named Bachtiar. His hands made rapid circles over my Sumatra map, spread atop an oil drum. "The wind starts to be like this," he said. "It comes from all around. You can't go anywhere." This confused pattern heralded the start of the southwest monsoon; Marco was stuck until the wind blew again from the northeast.

Marco's fleet put in at a small kingdom named Samudra—from which "Sumatra" derives—and here, Marco says, the passengers camped for five months, building "castles of beams and of logs" on the beach.

Pretty crude castles, I imagine. Still, as I sat on a beach one day, shaded by the thatched roof of an open-air café, I judged that Marco had discovered a



wonderful life. Sumatra had "the best fish in the world," he said. Yes indeed, I thought, enjoying a succulent specimen, a *bawal*, grilled over wood coals. "They have a very great quantity of Indie nuts very large and good," added Marco, who surely guzzled the sweet nectar of these coconuts, as I also did while listening to the lap of the surf. If you wanted a drink with a kick, you could swig *tuak*—fermented palm tree sap, greenish, watery, and about as strong as beer. Marco called *tuak* "very good wine." All I can say is, two glasses gave me a headache.

for fear of those bad beast-like men who eat men."

Much of Indonesia was engulfed in violence when I followed Marco's trail to Sumatra. In the province of Aceh, where Samudra's remains lie, a decades-old independence struggle by Aceh rebels had flared anew, with hundreds of casualties.

Marco and the other travelers apparently got along with the Samudrans. But beyond the coast lived a people who were "such as beasts," Marco recorded. "For I tell you quite truly that they eat flesh of men." These were assuredly Bataks, in some ways a sophisticated people, possibly having an alphabet and calendar even in Marco's era. But they devoured their enemies—to capture their spirits.

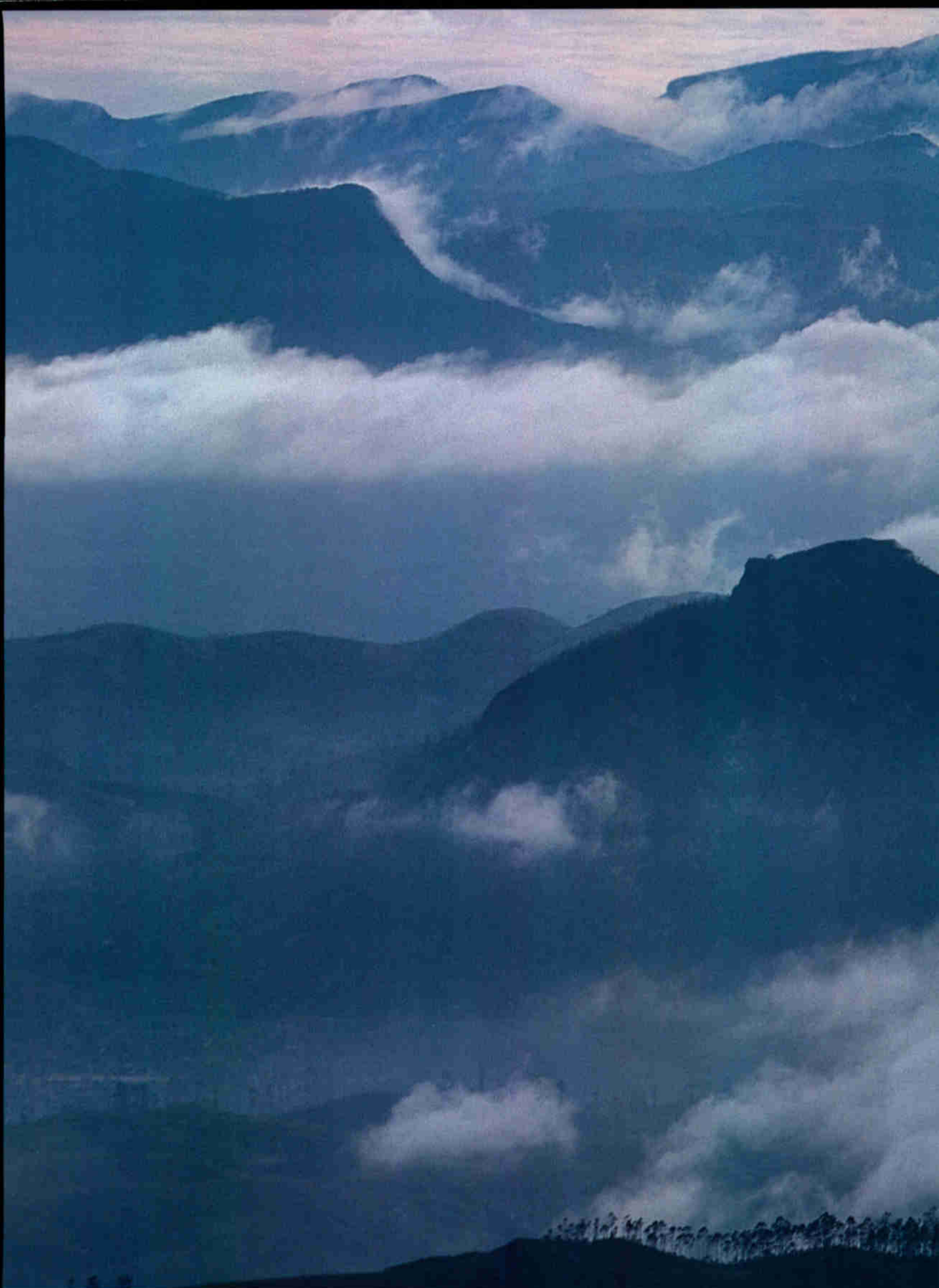
Bataks, who number about five million today, don't hide from their past. Andreas Lingga, director of a Batak museum, displayed his palm and told me, "My grandfather said this was the most desired part. It wasn't the sweetest, but the elders thought palm flesh had medicinal properties."

A Batak woman, Ningrum Sirait, said: "It's a joke now to warn somebody, 'Don't play games with us—we eat people.'"

No part of strife-torn Indonesia is more tranquil than the Batak heartland, in the mountain spine of northern Sumatra. In a van I spiraled up into those peaks and at about 3,000 feet reached Lake Toba, which fills a volcano's caldera. Some volcano! The lake is 55 miles long.

On an island spread a lush little village named Tuk Tuk, fruited with mangoes, bananas, papayas, and coconuts. The distant view was of green





*M*ountains throw off blankets of clouds at dawn in a view from Adam's Peak, a pilgrimage site mentioned by Marco on the "Isle of Seilan," now Sri Lanka. Some believers, Marco



reported, came to visit what they held to be the grave of Adam. Others saw signs of the Buddha. Pilgrims still climb the steep, 7,360-foot pinnacle.





“They have wine from the trees.”

Palm wine made a potent impression on Marco in Sri Lanka, where men still walk the treetops to collect sap for the alcoholic drink. Marco also sampled “Indie nuts”—coconuts—which in Kerala, India, are husked and dried for their meat.

water, mountain ridges, and thunderheads gathering to deliver the afternoon rain. It was Sunday, and along the narrow roads women walked in long brocaded skirts, Bibles in hand. I followed them to a church.

Two missionaries from New England who arrived in 1834 were unfortunately mistaken for enemies, and the Bataks ate the “Westerners’ arrogance,” as they put it. But in 1862 a German Lutheran, Ludwig Ingwer Nommensen, came to town better prepared; he had studied the Batak language. Nommensen gave Batak words to many German hymns and drew a response *con brio*. “Bataks start singing in Sunday school and keep on until they go to the grave,” a lay preacher told me. On my Sunday in Tuk Tuk the congregation sent hymn after hymn—11 in all, I believe—soaring over the tranquil village.

In truth, life on the beach was far from idyllic for Marco and his companions. That coast receives eight feet of rainfall a year; in October, when I was there, it comes down in buckets. I doubt that the thatch of Marco’s “castles” held back these torrents. The insects must have been savage. And old Chinese records warn of “malarious fevers” in Sumatra.

Here may be clues to why only 18 of Marco’s 600 companions survived the two-year voyage. Marco offers no explanation; throughout his book he is eager to describe the world but usually reticent about sharing his own experiences. “My guess is that there was an epidemic of some kind,” says Alvise Zorzi, a Venetian and author of a lively Marco biography. Count Zorzi—one of his ancestors was a doge of the republic—also acknowledges the possibility of “a big tempest at sea with the loss of some ships.”

The hazards of a journey such as the Polos’ were vividly chronicled half a century later by the great Moroccan traveler Ibn Battuta.* Making his way

*See “Ibn Battuta, Prince of Travelers,” by Thomas J. Abercrombie, NATIONAL GEOGRAPHIC, December 1991.



“Most worship the ox,” wrote Marco about the Hindu faithful in India. He probably witnessed such outpourings of devotion as when a priest at Brihadishwara temple in



Thanjavur bathes with curried milk a statue of Nandi, the mount of the god Siva. Marco marveled that Hindus refused to eat beef and smeared their homes with cow dung.

from India to Sumatra, he saw two junks founder with great loss of life, and he himself had to be rescued from another ship that ran aground in a storm. In the Maldives he was ill for weeks with what may have been malaria. In India he encountered a terrible epidemic; "Whoever fell ill," he wrote, "died in two or three days."

Maybe Marco did not elaborate on the loss of life among his fellow passengers because, like most people of his time, he accepted death as an unremarkable event. Or maybe, Count Zorzi suggests, Marco's collaborator Rustichello, writer of romances, omitted these facts because they weren't heroic.

FINALLY, after a five-month wait, favorable winds blew again, and the fleet set a westerly course, pausing at "Seilan"—Ceylon, now Sri Lanka—before turning north to India. The ships still must have been moving slowly, for Marco says that after leaving Samudra, they "sailed through the sea of Indie quite eighteen months before they were come where they wished to go," the Persian port of Hormuz. Perhaps the fleet was stranded in India by another shift in the monsoon.

Southern India charmed Marco. "They have all things different from ours, and they are more beautiful and better," he wrote. Their peacocks, for example, were "much more beautiful and larger." And rice and "all things which are needed by the body of man for life they have in great abundance."

I wonder if Marco saw rice spread to dry on roadbeds, as I did sometimes. Cars and trucks squeezed to the pavement's center to avoid the slathers of grain. Women turned the rice with shovels. They wore saris that were scarlet, salmon, and fuchsia, matching the bougainvillea cascading from fences. India is nothing if not colorful.

I traveled a thousand miles by road, tracing the subcontinent's tip and following routes Marco could have taken if he wandered extensively on land, as seems to be the case.

It's likely he visited the city of Thanjavur (formerly Tanjore) and may have strode in the courtyard of the Hindu Brihadishwara temple, the "Biggest Temple of Siva," which was already three centuries old. It was covered with carvings of elephants, lions, and other animals.

Today the courtyard is dominated by a 13-foot-high stone statue of the bull called Nandi, whose strong back transports the god Siva. Hindus in southern India believe Nandi makes rain come and crops grow.

The day I visited, 5,000 people had gathered to see Nandi receive his



Heat and nakedness got Marco's attention in India. These elements persist on a busy Kerala beach where a girl spangled in fish scales combs through her family's net. Pirates—"evil corsairs"—roamed this coast, Marco warned, inflicting "great loss to the merchants."



fortnightly bath, a literal outpouring of veneration. Priests standing on a scaffold doused the statue with vats of milk, coconut water, vegetable oil, sugarcane juice, and honey.

As the cascades descended Nandi's flanks, many of the faithful clasped their hands and prayed for favors. We were all shoeless, as temple protocol required. One bath, of milk laced with yellow spices, sent up the pungent aroma of turmeric and, splashing down to the courtyard bricks, changed the color of our feet to that of a well-seasoned curry.

Kollam, a modest city in Kerala state, is strung on a low ridge between the Arabian Sea and a labyrinth of lagoons and streams. In Marco's day Coilum, as he spelled it, boomed. From a palm-shaded bluff I looked out on a lagoon that had sheltered junks from China and dhows from Arabia and Persia. They came especially for the "spicery," to use a Polo term. It meant not only flavorings such as pepper, nutmeg, cloves, and ginger that Europeans craved to pep up their bland food or to preserve it, but also medicines, perfumes, and dyes.

In Kollam were also "physicians who know well how to keep mens bodies in health," Marco remarked, no doubt meaning healers who employed spicery. I followed such a man into his garden. "I can show you a thousand kinds of medicinal plants here," said this traditional physician, Cheriyl Sukumaran Nair. He wore a white dhoti and carried an umbrella against the sun. "I learned medicines from my father," he said. "All my forefathers were medical practitioners."

He cut a strip of cinnamon bark for me to chew. "Good for the heart and lungs," he said. "Over there," he continued, "that tree—it yields a medicine for leprosy. I have medicines to increase potency and to treat snakebite and prevent baldness."

He paused by a shrub and declared, "Today in Kerala you will hardly see this except in my garden." The plant was indigo, whose leaves were the source of a rich blue dye once eagerly sought by traders. "They have very good indigo in abundance," Marco exclaimed of Kollam.

"The Chinese came here for dyes and for pepper, cardamom, and cinnamon," Nair said. "The trade was very large." Chinese ships brought silks, gold, silver, and copper, used as ballast.

Although Kollam's port silted up centuries ago, ending its trading era, the word *cheena*, meaning Chinese, is still a common adjective there. Fishermen harvest shrimp in a *cheena vala*, a Chinese net. And some people cook in a *cheena chatti*, or wok.



“There is very great abundance of pepper and of

Evidently the ships bearing the *Polos* and the *Blue Princess* sailed north along the Indian coast before turning westward. No one knows how many of the 14 original vessels continued on the journey. There may have been only a few passengers now, so perhaps most of the vessels stopped at Kollam, awaiting winds that would blow them back toward China. Perhaps several had wrecked.

The route was infested with pirates. India’s west coast, Marco wrote, was home to more than a hundred pirate ships. At sea 20 or so stationed themselves a few miles apart, waiting for a victim. Marco’s fleet, such as it was, must have crossed the Arabian Sea in a convoy with other vessels.

In 1293 or early 1294 the *Polos* at last reached Hormuz in Persia, which Marco had seen as a teenager on the way to China. On the long, disastrous voyage the *Polos* had “saved and protected” the Mongol princess, while nearly all the royal attendants perished. But in Hormuz they learned that Arghun, the ruler the princess was promised to, had died. She was given to his son Ghazan. There isn’t a happy ending to her odyssey; she was dead after less than three years in Persia, age about 22.

Marco says the lords of Persia honored the *Polos* lavishly, weighting them down with four more hefty golden paitzu. With a cavalry escort they rode northward through Turkey.

All went well until they left Mongol lands and entered the small kingdom of Trebizond on the Black Sea. Golden passports meant nothing to Trebizond’s ruler, who forced the *Polos* to hand over some of their wealth—goods worth about 4,000 Byzantine hyperpyra. That was a huge sum; it would have bought a thousand pounds of raw silk.

Marco’s book doesn’t mention this robbery; perhaps it was another episode too unheroic for Rustichello. We know about it from Uncle Maffeo’s will, which mentions it in a reckoning of family debts.

India’s commercial prospects impressed the merchant from Venice. Marco extolled the cotton of Gujarat, still a money earner as fields bloom with drying cloth. For Kerala he listed a cornucopia of spices. Cardamom, one of the most expensive, is still graded by hand.



ginger likewise; and . . . cinnamon enough.”

A VENETIAN LEGEND, recorded in the 1500s by a scholar named Giambattista Ramusio, says the Polos in their 24-year absence had been given up for dead. Their kin did not recognize them when they returned in 1295. They were in rags, and exuded “a certain indescribable smack of the Tartar both in air and accent.” But this shabby trio, Ramusio continued, soon put on a flamboyant display, assembling relatives to watch them rip open their ragged clothes and remove “vast quantities” of rubies, diamonds, and emeralds.

All Venice, declared Ramusio, “flocked to the house to embrace them” and to interrogate Marco. He may have begun right away to write about his adventure; one Italian expert has argued that Marco intended to produce a manual for merchants traveling to the East.

Venice had for years been fighting a sea war with its arch rival Genoa, and not long after the Polos returned—possibly only a year afterward, Count Zorzi says—Marco became a casualty in that conflict. One legend holds that Marco, an experienced seaman, was commanding a war galley in the Mediterranean; Zorzi, however, believes he was merely a traveler on a commercial vessel captured by Genoese corsairs.

In any case, he ended up a prisoner in Genoa, sharing a “dungeon,” his book declares—in truth, it may have been a place less grim—with the writer Rustichello, who evidently had been captured in a fight between Genoa and his native Pisa.

Marco, says Ramusio, was able to send to Venice for his notes, and soon Rustichello was adding his own romance-novel zest to Marco’s mass of geographic, demographic, and trade reportage. Rustichello probably threw in the scenes of battles between Mongol lords and gilded Marco’s already lush descriptions of Kublai’s palaces. It may have been Rustichello who transformed the Polos into ordnance engineers, builders of catapults for Kublai’s



Cremation awaits a deceased holy man, borne by fellow ascetics through the streets of Junagadh in Gujarat. Marco did not grasp the Hindu concept of reincarnation, yet funeral



pyres engrossed him. He described the now rare custom of suttee, in which a widow chooses to be burned alive on her husband's pyre. "These ladies . . . are much praised," Marco noted.

army—even for a battle that occurred before they reached China.

The book's opening words are certainly Rustichello's: "Lords Emperors, and Kings, Dukes, and Marquesses . . . and all people who wish to know . . . the diversities of the different regions of the world, take then this book and have it read." In a previous book Rustichello also began, "Lords, emperors and princes."

Yet it is indubitably Marco's book: his observations, his opinions, his low-key, reticent personality. I carried a Rustichello text—one of some 150 versions, no two alike—during my travels in Marco's footsteps. It rang true across Iran and Afghanistan, within China, and on Marco's home-ward journey.

Marco was freed from prison in 1299 and brought his manuscript to Venice. "All Italy in few months was full of it," wrote the 16th-century scholar Ramusio. A wild exaggeration, of course; not many people could even read. Still, by medieval standards *The Description of the World* was a barn burner. Scribes set to work with quills, copying and translating. One manuscript that survives in France, supposedly obtained from Marco himself in about 1307, became the basis for several French copies. Within 20 years *The Description* also had been copied into Latin, the Tuscan and Venetian dialects of Italian, and probably German. The first printed edition appeared in Nuremberg in 1477.

Rustichello wrote in French with a heavy Italian accent; French was the literary language in Italy. A Dominican friar, Francesco Pipino, recorded that he obtained a version of the book written in *lingua lombarda*, Marco's Venetian tongue. Count Zorzi believes "this proves the existence of an original text written by Marco"—apart from Rustichello's. Some scholars think Marco wrote more than one version or continued to add passages as years passed.

Pipino's superiors directed him to make a Latin translation to inform the Dominicans about the East, where they soon founded missions. Other Europeans were also emboldened to set out for China. Tombstones and documents confirm the presence of numerous Italians in the mid-1300s.

Padre Pipino could have met Marco close to Venice's busy Rialto commercial district, where the Polos bought a property that may have included several houses; it has been described as a mansion. Here Marco spent the last 25 years of his life. He married soon after being freed from prison, age about 45, and fathered three daughters.



"We go naked because we wish nothing of this world." Thus Marco quotes a holy man similar to this sadhu in Bombay, who has not worn clothes in 46 years. He owns only a bowl and a feather duster. "It is a great wonder how they do not die," Marco wrote.

MORE ON OUR WEBSITE

View a special multimedia presentation covering Marco Polo's full 24-year odyssey to China and back at nationalgeographic.com/ngm/0107.



WALKING in courtyards where his home had stood—it was destroyed by fire in 1596—I glimpsed only a fragment of structure that Marco probably knew, an archway embellished with small carvings of animals.

I didn't see the Polo name on the courtyards; rather, they are called Milion, the nickname Marco acquired after his return. It endures today as the name by which his book is known in Italy. Some people think "Milion" means he was a millionaire, and some think it means he was a gross exaggerator—a liar.

"I believe it means neither," Count Zorzi said. We were talking in his residence, which looks out on the Grand Canal. Marco's house once stood just 300 yards away. "He never had millions," the count said. "He had rather good wealth, but it was not enormous. 'Million' was an unusual word in his time. But I think he may have used it in the stories he told, maybe when referring to Kublai's wealth. So he was the man who talked of millions." Venice delighted in nicknames: Big Eyes, Big Belly, Milion. Some

scholars, however, say Milion derives from a Polo ancestor named Emilio.

There were, of course, skeptics, unable to believe even Marco's truthful reports, of cities in China grander than Europe's, of a rock that burned and cloth that did not. A contemporary wrote that Marco defended his text even as he lay dying in 1324, age about 70. To friends who begged him to recant before he met his God, he replied: I did not write half of what I saw.

At his death he possessed a golden paitzu and a princess's headpiece with "precious stones and pearls"—a gift from the Blue Princess, perhaps?

It took about 80 years for the geographic knowledge Marco collected to begin showing up on Europe's rudimentary maps. John Larner, a historian at the University of Glasgow and author of a new evaluation of Marco's influence, explains the delay like this: "Imagine yourself a mapmaker and you pick up Marco Polo's book and you say, 'Right, here's this chap telling us about places on the other side of the world, but how am I going to translate all that to a map?' For one thing, you haven't got any longitude and latitude."

But gradually Marco's place-names began to appear: such Chinese ports as Quinsai and Zaiton, plus Cipangu, Java, Sumatra, Ceylon, Zanzibar.

"Never before or since has one man given such an immense body of new geographic knowledge to the West," John Larner concludes. Not in the seven centuries since his book appeared, I think, has Marco received an accolade more resounding.



Shortly after his return to Venice in 1295 Marco was captured at sea, possibly by pirates. One tradition suggests he was imprisoned in Genoa's Palazzo San Giorgio, shown in



watery reflection. Marco devoted his prison time to composing his book. On his deathbed in 1324, the legendary adventurer reflected that he had many more stories to tell.



THE AMERICAN DREAM

HAS LONG PROMISED LIFE, LIBERTY, AND

THE PURSUIT OF A SPACIOUS SINGLE-

FAMILY HOME IN THE SUBURBS (WITH A

POOL, EVEN). BUT AS NEW GENERATIONS

OF HOME SEEKERS LOOK FOR BREATHING

ROOM IN THE BURBS AND THE LANDS BE-

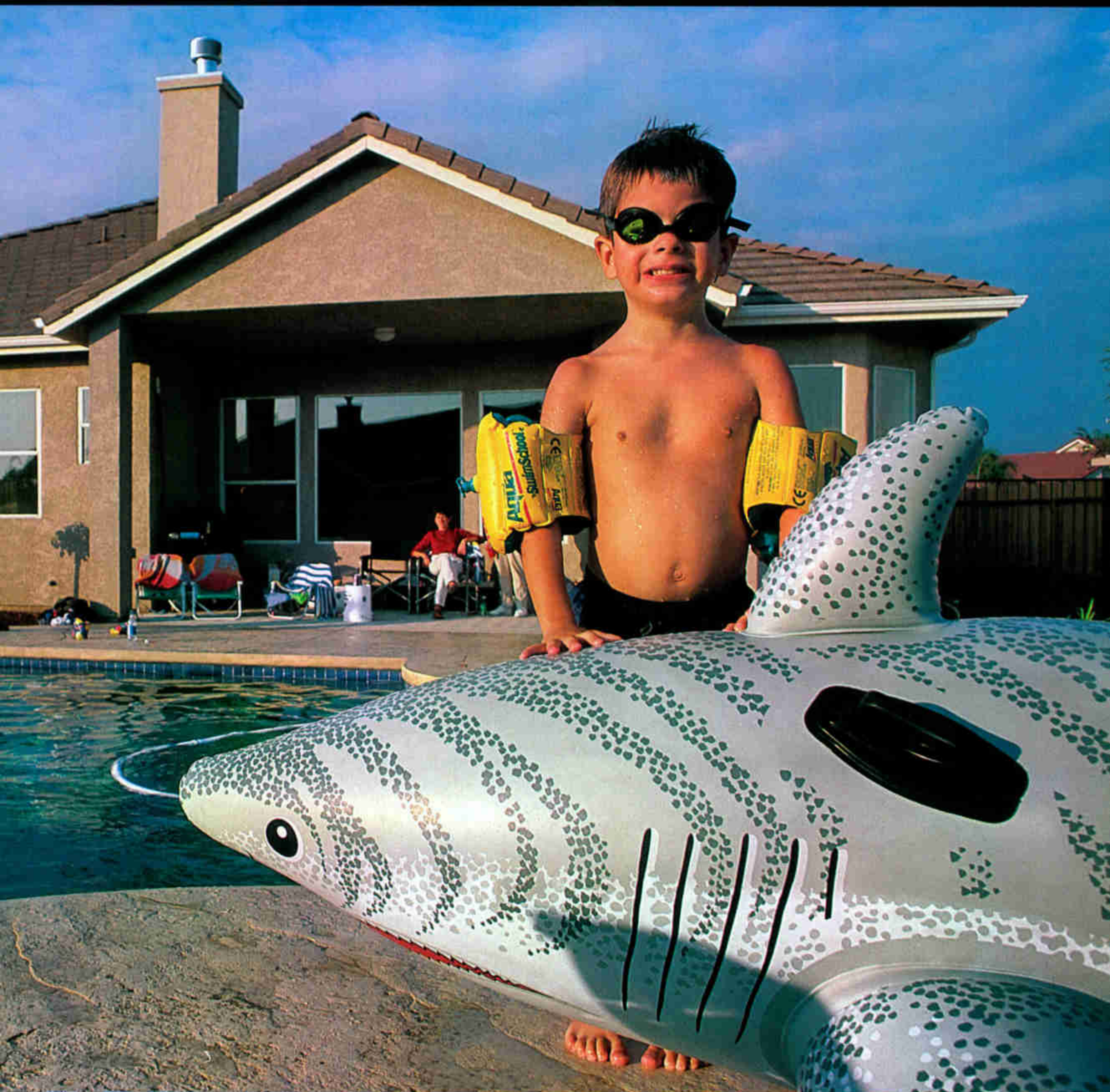
YOND, THE DREAM HAS BEEN DISPLACED

BY ALL TOO FAMILIAR WORLDS—PLACES

PLAGUED BY TRAFFIC JAMS, HIGH TAXES, AND POLLUTION: THE IRONY OF



HAYDEN AUSTIN'S FIRST DAY AT HIS NEW HOME: CLOVIS, CALIFORNIA



URBAN SPRAWL



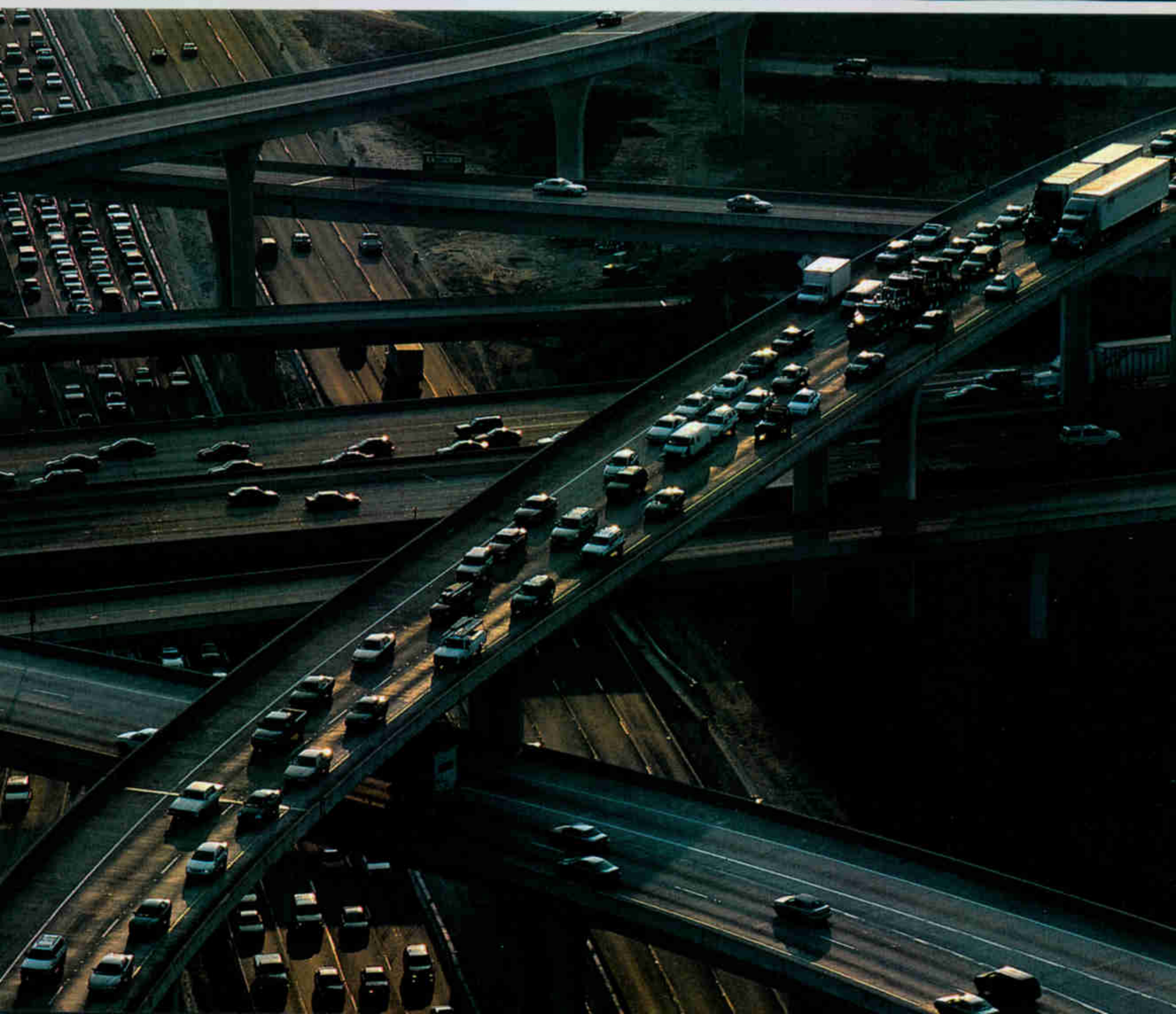
SPRAWLVILLE, U.S.A.: WHERE ARE YOU? (See map, page 56.)





CARS R US

A chain of automobile retailers also provides a sign of the times (top). Since 1969 the number of cars and trucks in the U.S. has grown twice as fast as the population—a surge with broad impacts. Garages, once built out back, are now often in front (above), with 17 percent of new homes featuring three-car garages. While cities build more roads to handle the rush-hour crush, they're never enough. Atlanta's "Spaghetti Junction" (right) gives many commuters indigestion, driving some to seek alternatives such as company-subsidized vanpooling. "You get to work a lot less stressed," says Andrea Wall (top right). "It's a peaceful time."



BY JOHN G. MITCHELL

SENIOR EDITOR

PHOTOGRAPHS BY SARAH LEEN

TOM SPELLMIRE lives with his mother on an 87-acre farm in Turtle Creek Township, Warren County, Ohio. One county away, to the south, lies Cincinnati. One county north, Dayton. Spellmire's is a place of silos and barns and a turn-of-the-century white frame farmhouse with a green roof. Another farm or two can be seen along the road in one direction. But going the other way, after a mile or so, you begin to run out of green roofs and open fields, and what you see instead are the kinds of manicured lawns and picture windows that for half a century have signified fulfillment of the American dream.

One blustery day late last year I traveled with Tom Spellmire to see how that dream had been playing around Warren County. Harvest time was behind him then, the corn and soybeans taken in, the winter wheat planted. Crops from a homestead of 87 acres couldn't begin to pay all his taxes, so Spellmire leases 2,400 acres from other landowners, though this is not as many acres as were once available to him. As we drove south, then west into an adjoining county, he could point to a subdivision (like Four Bridges) or an industrial site (Mitsubishi Electric) saying, "We used to farm all this land."

Spellmire is a tall, ruddy, intensely focused man who served on Ohio's Farmland Preservation Task Force in the 1990s. And he is not happy about the prospects for farming in Warren County. "Believe it or not," he says, "this county is promoted as having rural character, but the zoning codes, in effect, say: 'We want to develop everything.' That's why the county is a haven for real estate investors."

When investors come, can developers be far behind? And behind the developer comes the family in search of a home in the suburbs. We drove past or through a dozen new subdivisions that day. The Meadows at Mason. Heritage Club. Hickory Woods. Simpson Creek Farms. Presently we arrived

at a subdivision called Trailside Acres, featuring homes that we figured might sell for up to half a million dollars apiece. At the end of a cul-de-sac Spellmire gestured toward a wide, open field we could see in the distance beyond the slim side yards of the big houses.

"We lease that farm," he said. "We rotate corn, soybeans, and wheat on it." Then he shook his head. "And what I find so ironic is that all these people who live here look out their back windows and see this fine old farmstead. When I'm out there on a tractor, the subdivision kids are hanging over their fences, watching me. And you know what their parents say to the people who own that farm? They say, 'You're not going to sell it for development, are you? *Are you?*'"

AN OLD SAYING has it that you can't have your cake and eat it too. So it would seem in the land of the manicured lawn and the picture window, the treeless cul-de-sac, the sterile shopping center, the blockbuster mall, the corporate campus, the amorphous parking lot, the clogged highway that inevitably fails to serve its desired function as soon as it is built. Yet most Americans who live among these icons of suburban growth aren't terribly troubled by them. It's the way things are, a tolerable nuisance even if the process does gobble up the land, skewer the fabric of community life, and erode the economic base of older towns and central cities. And perhaps it is tolerable to so many because it has become so familiar. After all, outward growth of this kind has been occurring in most regions of the country since the end of World War II. Region to region the scenario has almost always been the same: As a city ages, crime and other urban problems induce many of the affluent residents to move out.

Cincinnati, for example, a century and a half ago the second most populous municipality west of the Appalachians, had by the 1960s begun to hemorrhage its



FIELD OF DREAMS

When home developers build them, people do indeed come—and in record numbers to Loudoun County, Virginia (below). The population today is roughly 170,000, compared with a steady 19,000 to 25,000 from 1790 to 1960. One cost of sprawl: huge losses of farmland.



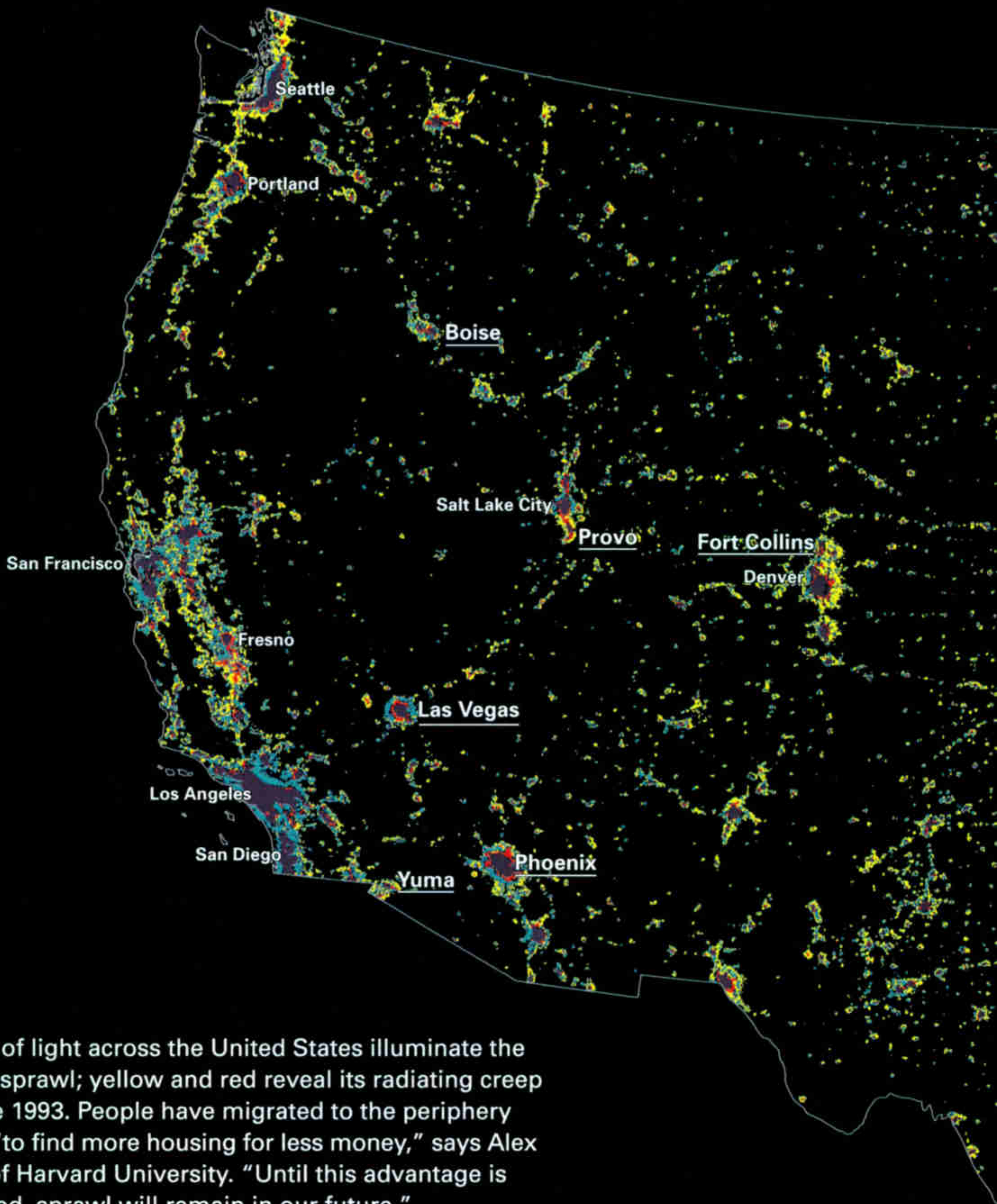
population into the exurbs of its own county, Hamilton. And by and by Hamilton began hemorrhaging too, into Warren and other adjacent counties.

“Why are the people leaving?” John Dowlin, a Hamilton County commissioner, put the question to himself when I called on him at the county courthouse in downtown Cincinnati. “I don’t think it’s just a racial situation.” African Americans now make up 43 percent of the city’s population of 330,000. “All the polls show that the people moving out are unhappy with the public schools. And they want larger homes on larger lots. I think what we’re seeing is that same old thing—people wanting a piece of the American dream.”

The media and the professional planners have long had another name for it. They call it sprawl. And they have measured its imprint on the nation in a hundred and one different ways. Here are just a few of them:

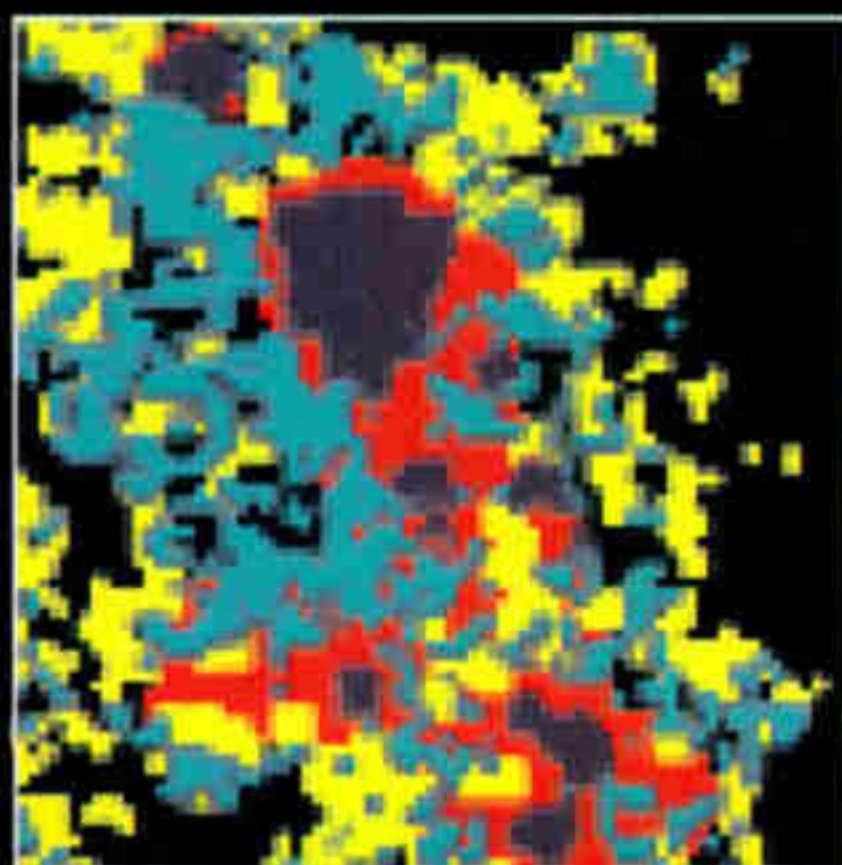
■ Seventy million Americans lived in the nation’s urbanized areas in 1950; these regions covered some 13,000 square miles. By 1990 the urban-suburban population had more than doubled, yet the area occupied by that population almost quintupled—to more than 60,000 square miles.

■ Phoenix, Arizona, one of the Sunbelt’s fastest growing communities, has been spreading outward at the rate of an acre an hour. Atlanta, Georgia, another overachiever, boasts

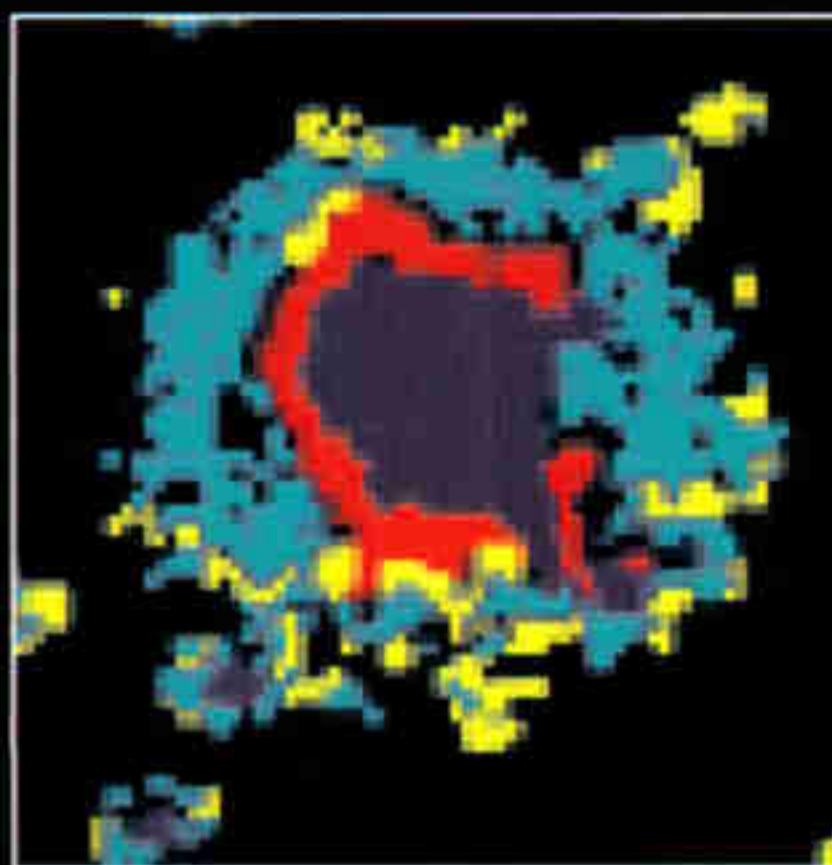


Galaxies of light across the United States illuminate the scope of sprawl; yellow and red reveal its radiating creep just since 1993. People have migrated to the periphery of cities "to find more housing for less money," says Alex Krieger of Harvard University. "Until this advantage is neutralized, sprawl will remain in our future."

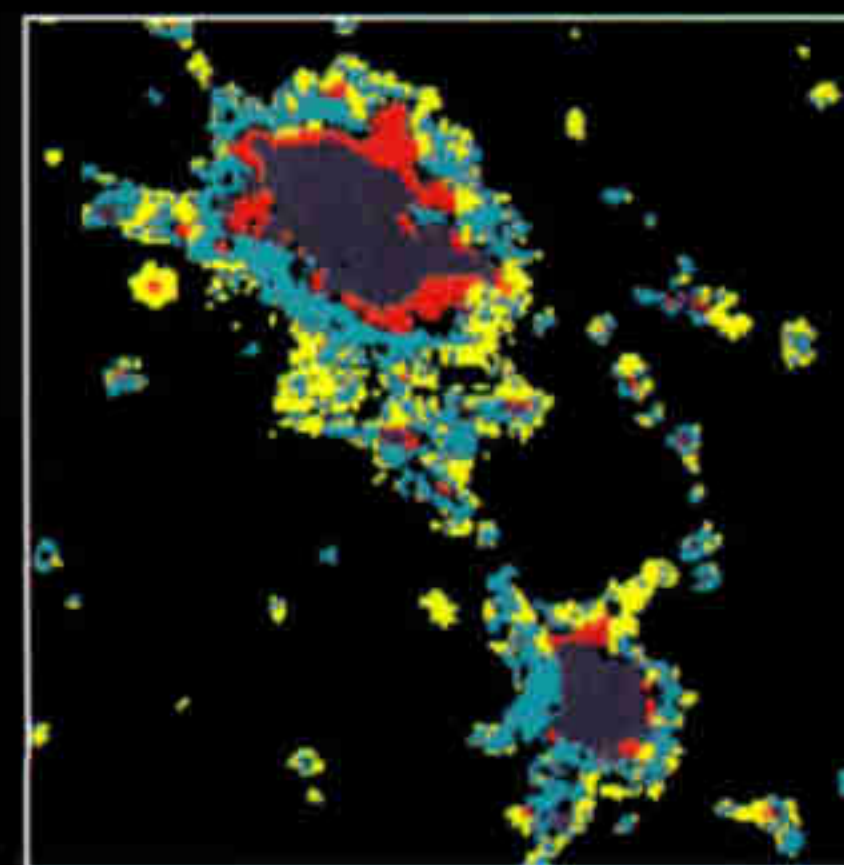
SPRAWL AT NIGHT: SEEING THE LIGHT



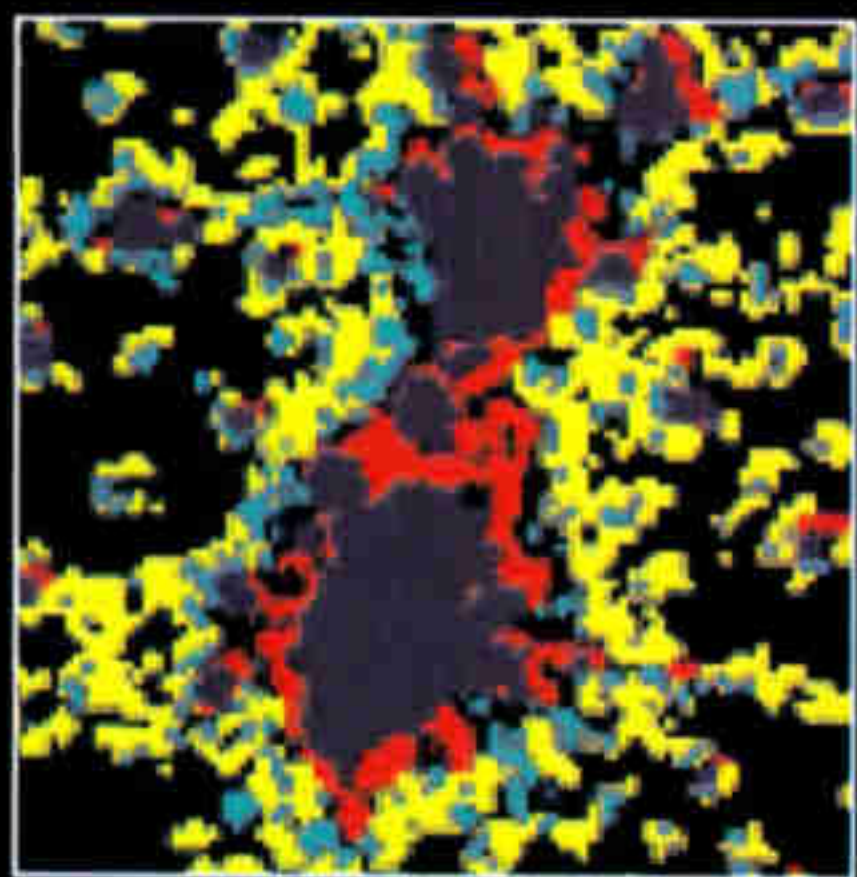
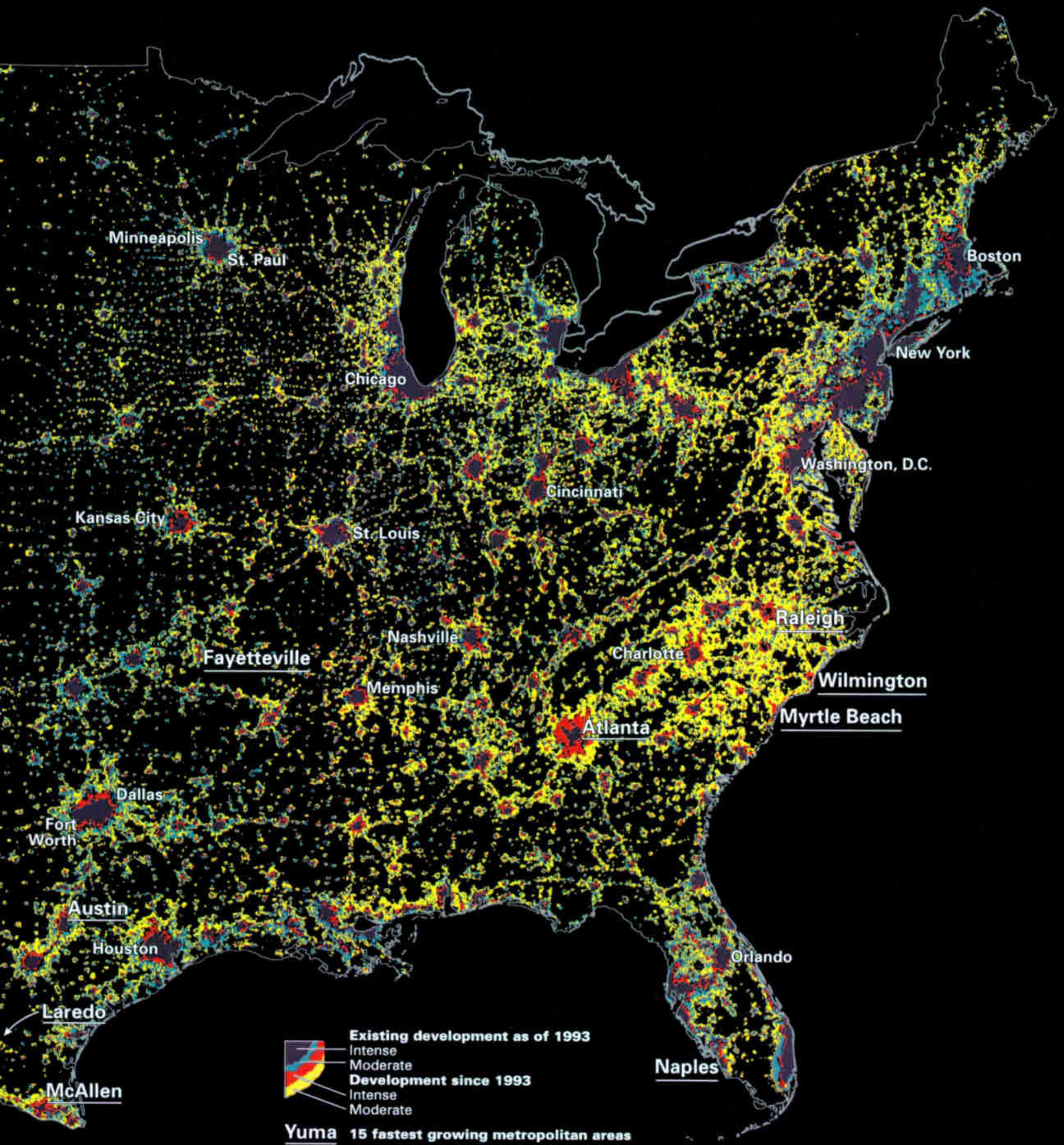
FRESNO, CALIF.



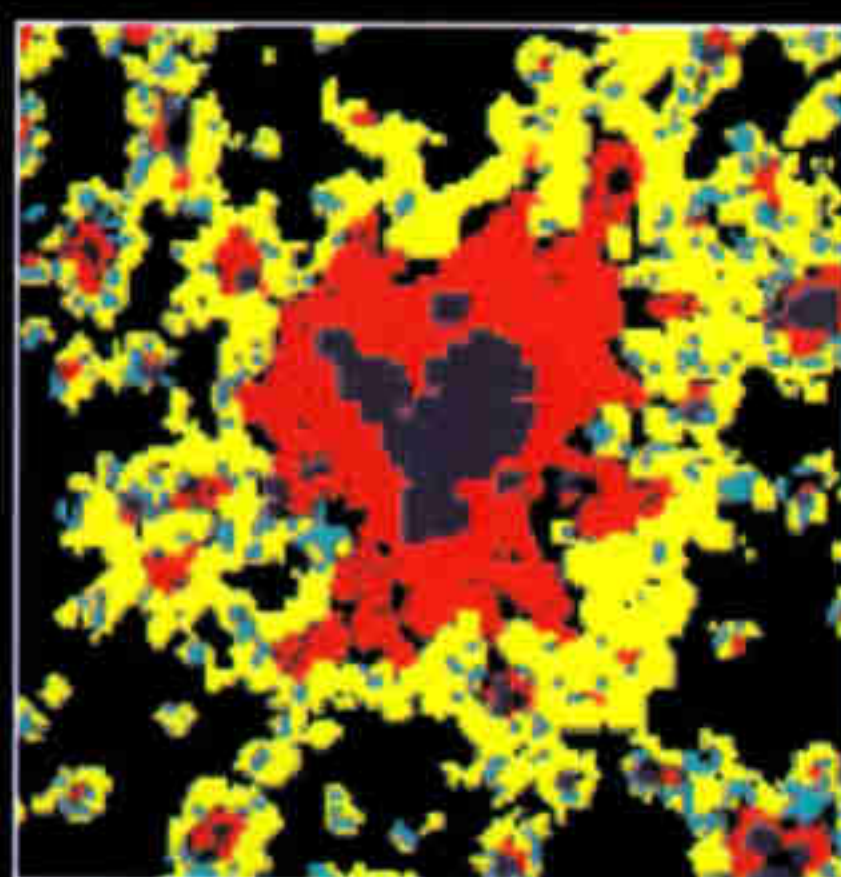
LAS VEGAS, NEV.



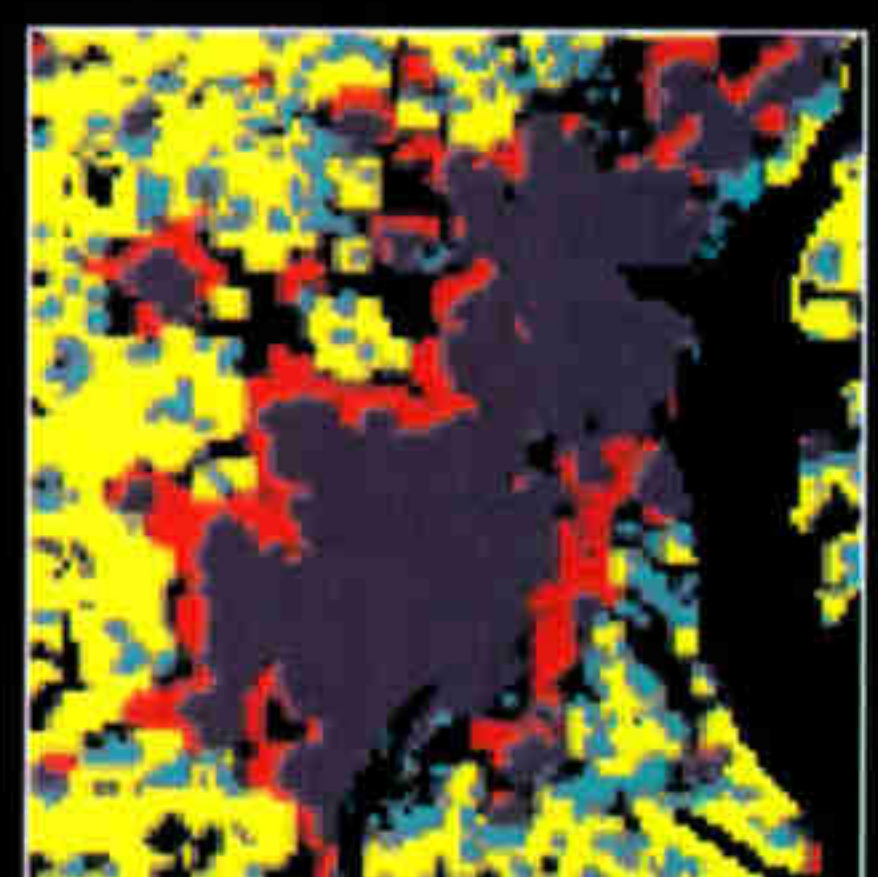
PHOENIX/TUCSON, ARIZ.



CINCINNATI/DAYTON, OHIO



ATLANTA, GA.



WASHINGTON, D.C./ BALTIMORE, MD.

a metropolitan area that is already larger than the state of Delaware.

■ Sprawl is claiming farmland at the rate of 1.2 million acres a year. Throw in forest and other undeveloped land and, for net annual loss of open space, you're waving good-bye to more than two million acres.

■ Sprawl keeps a person in the driver's seat. The suburban family, on average, makes ten car trips a day (keeping in mind that most families have two vehicles). A commuter living an hour's drive from work annually spends the equivalent of 12 workweeks, or 500 hours, in a car. Traffic delays rack up more than 72 billion dollars in wasted fuel and productivity.

developed raw land into residential subdivisions. The one I remember best was way out near what was then the far north edge of Greater Cincinnati, in the village of Woodlawn, at a place called Mayview Forest. It really *was* a forest then—oaks and hickories, and big sycamores down where the West Fork of Mill Creek cut through. I loved going to that forest with my father, seeing the limestone pools in the stream and smallmouth bass in the pools and squirrels in the hickory trees. While I fished or hunted, my father drove wooden stakes into the ground at the corners of his house lots. Now Mayview is just another old subdivision, and the north edge of Greater Cincinnati is

PERHAPS IT IS TOLERABLE TO SO MANY BECAUSE IT

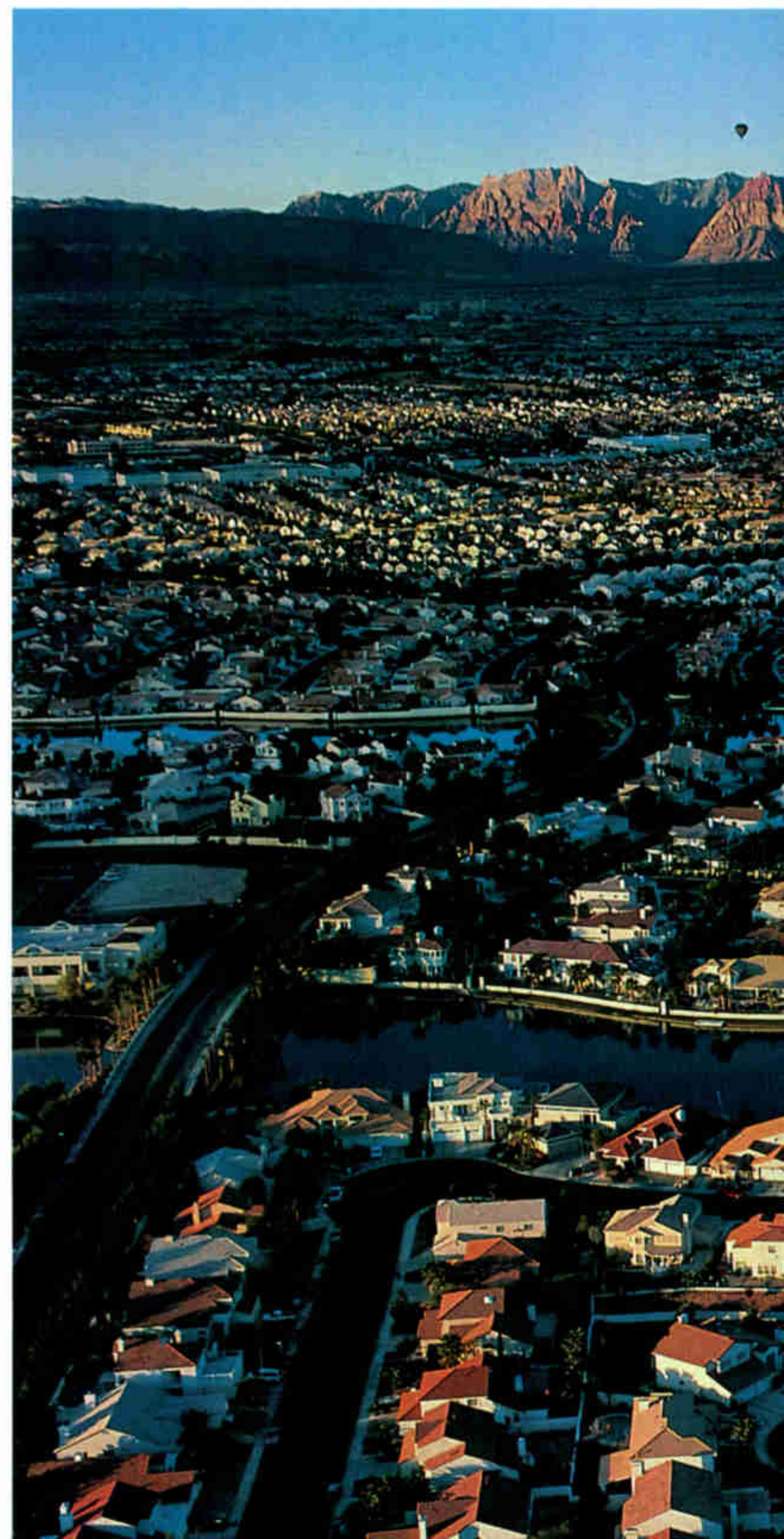
ODDS FAVOR THE HOUSE In Las Vegas—the fastest growing metropolitan area in the country—new homes are as plentiful as public parks and other common areas are scarce: For every thousand residents, two acres of the city are devoted to open spaces; Phoenix offers 31.5 acres.

■ So pervasive is sprawl, extremists are using it to justify their acts of ecoterrorism. Last year in suburban New York several houses and a condominium, all newly built and unoccupied, were set afire; earlier, gasoline was used to torch a luxury house for sale in Colorado.

■ By 2025 the United States will be home to nearly 63 million more people than are here today. If current trends prevail, they're going to need more than 30 million new homes. Most of those homes will be single-family, detached units built beyond the edge of today's newest suburbs. And most of the families occupying those houses will be in and out of their cars at least ten times a day.

A PART FROM THE FACT that the Greater Cincinnati area today ranks high on almost anyone's list of the nation's most sprawl-threatened metropolitan regions, I suspect it was the homing instinct that brought me back to southwestern Ohio. I grew up there through the 1930s and '40s, in a quiet neighborhood only four miles from downtown Cincinnati, in a house near the end of a winding sylvan street called Garden Place.

My father was in the real estate business. He



miles beyond it, rolling inexorably toward a confluence with Dayton in the once and former cornfields of Butler and Warren Counties.

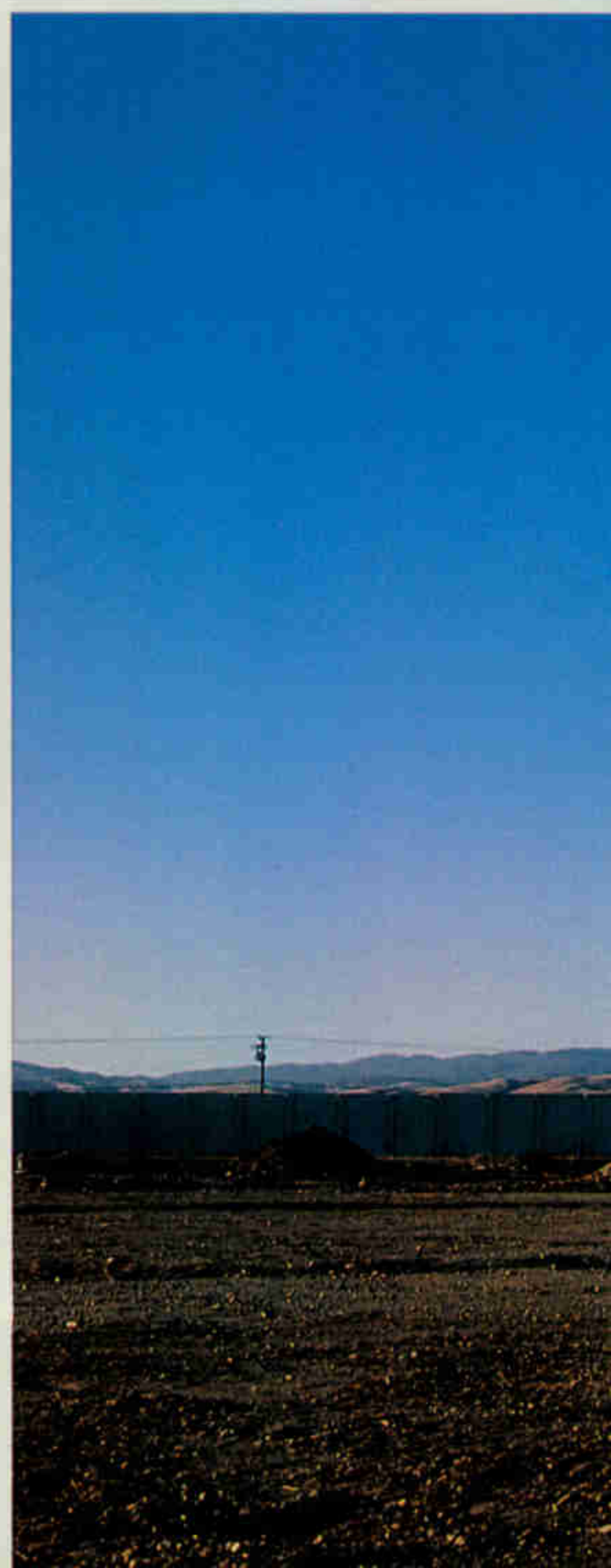
“This is one of the largest and fastest growing communities in Warren County,” Dan Theno was saying with a proud smile. Theno is the director of economic development and community relations for Deerfield Township. We were sitting in his office just off U.S. 22, a thoroughfare so congested at rush hour that the township trustees are begging the state for a major widening. Theno said, “We’re more than 25,000 residents now. We’re heading on a hundred million dollars of new development a year. We’re putting up 600 new homes a year.

Sure, good schools here *are* a primary draw. But so are jobs. We’ve got over 800 businesses right here in Deerfield, including some big names like Hewlett-Packard.”

To illustrate how aggressively the township is inviting such growth, Theno handed me a slick 24-page special advertising section that appeared in *Cincinnati Magazine*. Describing Deerfield as “a township for tomorrow,” the promotional copy reflected Dan Theno’s enthusiasm for the way Greater Cincinnati has expanded into this corner of Warren County. “Where rolling fields of corn once flourished,” the lead article declared, “businesses and residential communities have sprouted seemingly overnight, providing jobs and housing for the Tristate population as it moves north. . . .”

HAS BECOME SO FAMILIAR.





DEFINING CHOICES

Start with a dream—of a new, affordable home in a safe place with good schools. Maybe it's in sub-suburban California (right), or near Phoenix, Arizona (top right), or in Fulton County, Georgia (above). Wherever it is, when it comes time to shop, odds are you'll drive miles to the nearest mall or to a "big box" retailer—megastores that have helped close the Main Streets of America. "Short term we get cheap underwear at Wal-Mart," says Al Norman, founder of Sprawl-Busters, which helps towns repel the big companies. "But in the long run we raise our taxes and hurt our local economy and community. Everything you buy is an investment in something."



Coming Sept. 2000

The Mansionettes

*“Diamonds are a girls best friend but,
I’d rather have a Mansionette Home”*

Semi Custom Homes from 3018 Sq. Ft. to 3215 Sq. Ft.

NEW AMERICA HOMES



1-800-615-3330
www.newamericahomes.com

But not everyone in southern Warren County feels as cheerful as Dan Theno—or, for that matter, as threatened as Tom Spellmire, the farmer. Over in Mason I turned into a subdivision cul-de-sac to visit the home of Jim and Helen Fox, neither of whom believes that growth necessarily means progress. Jim Fox was born and raised in Mason and is now the city's vice-mayor. Helen Fox is co-founder of a small grassroots group called Balance, which seeks to put a brake on the way Mason and Deerfield have been growing.

"Every other day there was a story in the newspaper," Helen Fox said, explaining what motivated her to get active. "Traffic snarls one day, schools can't keep up the next—800 new students projected for Mason every year for the foreseeable future. And the day after that it's something else. So rather than get sick about it, we decided—Hey! What can we try to do to slow down this runaway train?"

We sat in the kitchen over coffee. The vice-mayor was away at work. She explained that the mission for Balance was just getting out the word about sprawl and maybe finding the funds to buy up a few of the green spaces remaining. "But let's be realistic," she said. "We're not going to change Mason now. It's so far along. I just hope it's not too late to make other parts of Warren County see what's happening so that they can become more thoughtful about how they want to grow in the future."

THE URGE TO MOVE ON lies entrenched in most Americans. It is a kind of cultural impulse, as one historian has defined it, "to withdraw from the great world and begin a new life in a fresh, green landscape." Here is the tired city, out there the fresh country, the pastoral Jeffersonian ideal, the sort of place where that fellow Thoreau built a hut and grew beans, far from the townies living lives of quiet desperation.

So begins the succession from country to suburb to sprawl.

Contrary to popular opinion, the suburb was not an invention of the 20th century. By the late 1800s suburbs galore—rural communities brought closer to the urban workplace by the moving miracles of streetcars and steam—ringed most of the older cities in the East. If Boston could have its Concord, then Manhattan would have the Bronx and Staten

"THE PEOPLE MOVING OUT ARE UNHAPPY WITH THE PUBLIC SCHOOLS. AND THEY WANT LARGER HOMES ON LARGER LOTS."

Island too. After the Civil War there were even a few new communities designed specifically for suburban living. One of the first was Riverside, Illinois, straddling a rail line nine miles west of the Chicago Loop. Laid out by the landscape architect Frederick Law Olmsted and his parkmaking partner Calvert Vaux, Riverside would become what one Olmsted biographer described as an "agreeable" community, "knit in upon itself by curving streets, a place apart but in convenient reach of a great city."

With Chicago's Riverside as an inspiration, if not a model, the great cities reached out to enlarge or establish other convenient and agreeable places apart—Scarsdale and Swarthmore and Shaker Heights, and Mariemont, right there on the eastern flank of Cincinnati.

At the end of World War II the United States faced an acute shortage of housing and promptly declared war on that. Loan programs previously created under the Federal Housing Administration and the Veterans Administration encouraged the development of single-family, detached houses in the suburbs. And the secret to that effort was the guaranteed fixed-interest mortgage, which in many cases made it cheaper to buy a house than to rent an apartment.

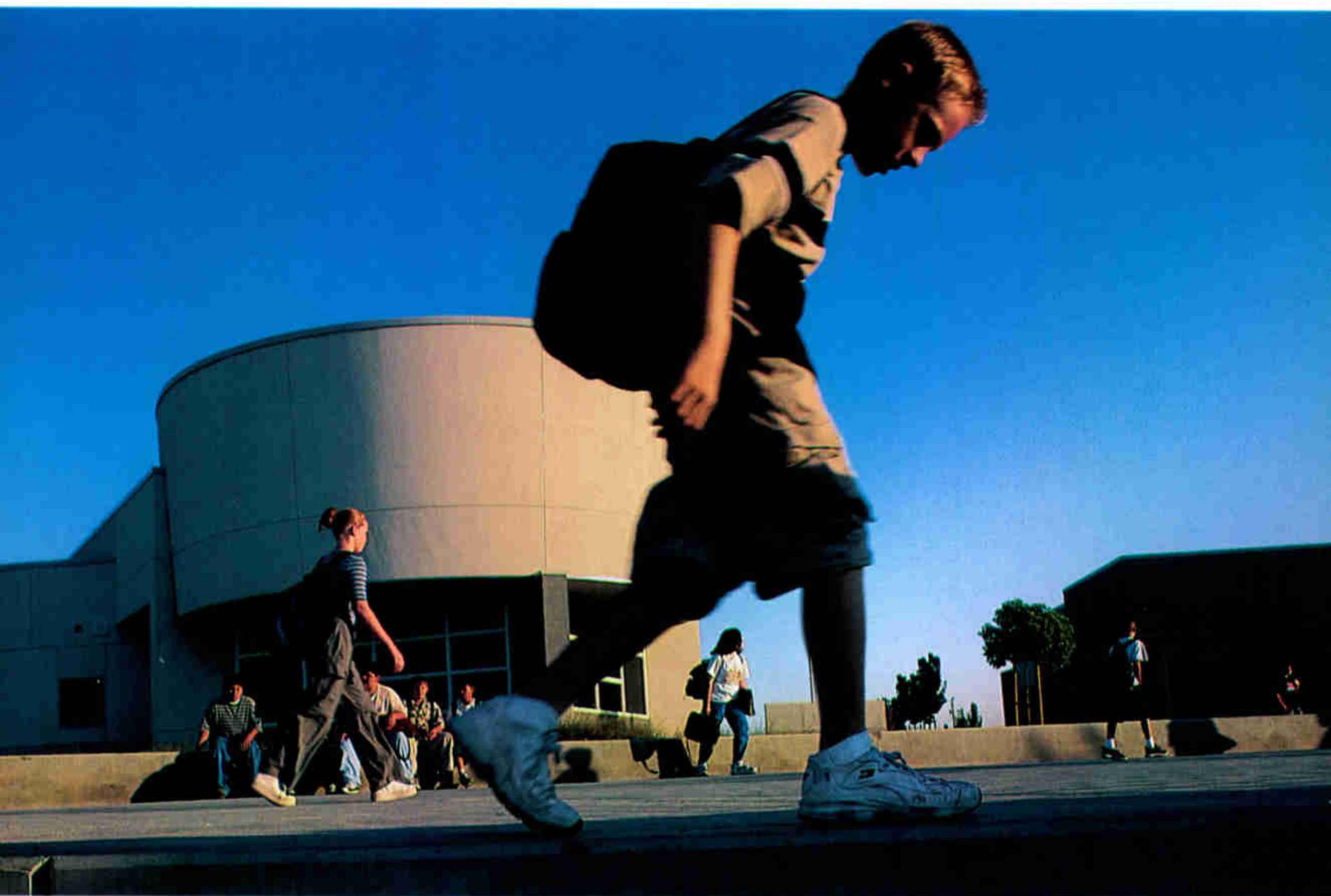
By most accounts nothing moved the suburbs so efficiently toward sprawl as a certain stroke of President Dwight Eisenhower's pen, signing into law the Federal-Aid Highway Act of 1956, which launched a 41,000-mile interstate highway system. Among other things, the interstates would grease the skids for commerce, industry, and a burgeoning roster of fast-food emporiums to roll off the exit ramps into a countryside previously reserved for corn. And it was thought at the time that the interstates would facilitate the evacuation of central cities in the event that our Cold War nemesis might post an intercontinental ballistic missile into

city hall. *Voilà!* A warhead did explode, but it wasn't nuclear. It was sprawl.

One of the most congested peripheral corridors in the nation is the stretch of Greater Cincinnati's own beltway, I-275, as it brushes the topside of Hamilton County to scoop up I-75 from Dayton and I-71 from Columbus before sending them on their converging way to and through inner neighborhoods of the central city. From his Turtle Creek farmhouse north of

YOU'D NEVER GUESS it from the looks of Greater Cincinnati and most other metropolitan regions around the country, but there is an alternative to mindless sprawl. Some people call it smart growth.

Smart growth rests on the assumption that we can curb sprawl by building better kinds of new communities, by fixing up and filling in the old ones, by finding ways to get people out of at least *some* of their cars, and by going out



MAGNET SCHOOLS

The schools in Clovis, California—including the Reagan Center (above)—are so respected that real estate agents use them as selling points. To sustain growth *and* a small-town feeling, the city channels development around three small urban centers rather than one big downtown.

the beltway Tom Spellmire can get to either of these interstates in less than 20 minutes. That fact alone may explain why, given the bracketing proximity of three superhighways, Warren County is on such a roll, and why Tom Spellmire's farming future isn't.

into the countryside to preserve large tracts of open space before the developers can pave them. This is one tall order, and only time will tell to what extent it can be filled.

One measure of how the nation might be willing to tackle the smart-growth agenda is the ballot box. Last November referenda authorizing bonds or tax increases to pay for land conservation, neighborhood redevelopment, or mass transit passed overwhelmingly; voters said yes to seven of every ten growth-related initiatives in state and local elections. And in Ohio voters approved a 400-million-dollar measure for redevelopment of abandoned

During the late 19th and early 20th centuries cities were crowded and often unhealthy places, especially when compared with early suburbs like New Jersey's Llewellyn Park (1853) and New York's Forest Hills Gardens (1909). By the 1950s the stream toward the suburbs had become a surge, thanks in part to changes in laws, finance, technology, and culture.

CULTURAL CURRENTS

Following World War II, the nation's supply of housing cannot satisfy demand fueled by economic prosperity, the baby boom, the availability of affordable automobiles, and roads to run them on.

1920

The number of people in the U.S. for every car: 13

1921

First drive-in restaurant in U.S.—the Pig Stand—opens near Dallas.

1947

Levittown, New York, provides mass-produced, inexpensive homes for returning GIs and ushers in the age of the post-World War II car-dependent suburb.

new middle-class homes, providing comfortable entertainment at home rather than in public places.

1970s

More Americans live in suburbs than in cities. Those who both live and work in the suburbs outnumber by two to one suburbanites who commute to jobs in cities.

1973

The Arab oil embargo drastically (though temporarily) raises the economic costs of the car culture.

1980

U.S. office space in suburbs surpasses that in downtowns. By 2001 suburbs will have almost two times more office space than city centers, much of it located in

OVER FRUITED PLAIN, WAVES OF GRAIN:

WASHINGTON PAVES THE WAY

Congress and the courts encourage suburban growth.

1926

The U.S. Supreme Court in *Village of Euclid, Ohio v. Ambler Realty Co.* provides legal protection for local governments that pass zoning laws in order to separate different land uses, such as the exclusion of multifamily housing from single-family neighborhoods.

1934

The newly created Federal Housing Administration (FHA) insures long-term mortgages, enabling ordinary citizens to buy homes.

1944

The Serviceman's Readjustment Act—the GI Bill—creates a mortgage program that helps returning World War II veterans buy homes.

1956

The Federal-Aid Highway Act authorizes construction of a 41,000-mile interstate highway system, with the federal government paying 90 percent of the costs.

1950

The number of people in the U.S. for every car: 4

1955

The low glass buildings of the General Motors Technical Center in Warren, Michigan, are completed, heralding the age of the modern suburban office park.

1956

America's first enclosed shopping mall opens near Minneapolis. Its designer, Victor Gruen, argues that with proper planning malls can provide "crystallization points for suburbia's community life."

1950s and '60s

Air-conditioning and television become standard amenities of

"edge cities"—residential and commercial centers along highway corridors outside older cities.

1990

The number of people in the U.S. for every car: 2

RACE, RIOTS, AND RENEWAL

After African Americans migrate from the rural South to the urban North, they find themselves trapped in decayed urban housing and face racial discrimination.

1933

The Home Owners Loan Corporation standardizes methods for appraising homes. The new rules favor houses in white neighborhoods outside city cores.

1949

Congress authorizes federal loans for cities to redevelop blighted urban areas.

"Urban renewal" razes not only slums but also stable low-income ethnic and African-American neighborhoods. The net effect is a loss of affordable housing.



NEW JERSEY TURNPIKE OPENS, 1951



COMING HOME: LEVITTOWN, NEW YORK, 1957

SUBURBIA MARCHES ON



SCHOOL DESEGREGATION: ARKANSAS, 1957

1954

The Supreme Court decision in *Brown v. Board of Education of Topeka* is the first in a series of judicial and legislative acts that outlaw racial segregation in schools, housing, and public transportation.

1950s and '60s

Exploiting whites' fears of racial integration and urban unrest, land speculators engage in "blockbusting"—buying homes in the city on the cheap, then selling them to black families at inflated prices.

1960s

Media coverage of race riots in Newark, Detroit, Los Angeles, and elsewhere frighten many white

Americans, convincing them that cities are unstable and dangerous.

1968

The Fair Housing Act prohibits discrimination in housing and lending.

1993

The federal Hope VI program funds redevelopment of old public housing projects—such as Chicago's Cabrini-Green—into mixed-income, mixed-use communities.

2000

African Americans are moving to the suburbs too. From 1970 to 2000 the black population in Maryland's Prince George's County, outside Washington, D.C., jumped from 14 to 63 percent.

SEEDS OF A TURNAROUND

Americans begin to reclaim cities even as suburbs swell.

1959

San Francisco residents pressure city officials into halting several planned highways. News of the "freeway revolt" mobilizes activists elsewhere.

1970s

The Clean Air Act and the Clean Water Act force cities to clean up their own backyards.

1973

Oregon enacts legislation that requires its 240 cities to establish urban-growth boundaries to control suburban sprawl.

1991

Congress grants localities more flexibility in using federal highway dollars for mass transit and other non-highway transportation.

2000

Nationwide, voters approve 400 of 553 growth-related ballot measures. Most promote "smart growth," which encourages pedestrian-friendly communities, a mix of housing types, and less dependence on the car.



THE "NEW URBANISM": SOUTH CAROLINA, 2000

industrial sites and—good news for Tom Spellmire—farmland and green-space preservation.

Smart-growth advocates looking for further encouragement or inspiration are likely to turn to the one state that has managed better than any other to put a brake on runaway sprawl. That state is Oregon. And the man who designed the brake was its governor from 1967 to 1975, Tom McCall.

Early on, McCall ordered a study of land use patterns in the crop-rich Willamette Valley. Among other things, the study found that in the 1960s Clackamas County lost 100,000 acres of farmland to development flowing outward from Portland. Oregon, said McCall, was under

density, he is simply putting a spin on that impossible human urge to have it both ways. Obviously, to avoid hateful sprawl outside, density somewhat less hateful must be accommodated inside the urban-growth boundary.

And yet today there isn't a whole lot to dislike about Portland. It is a handsome, tight little city of some 529,000 people (up from 366,000 in 1980) tucked into the confluence of the Willamette and Columbia Rivers; its downtown, pedestrian friendly; its residential areas growing *up* rather than out; its growth in transit use outpacing its increase in auto use. Its open spaces range from Forest Park, at nearly 5,000 acres the largest woodland park

THERE IS AN ALTERNATIVE TO MINDLESS SPRAWL.

NEW-FASHIONED OLD

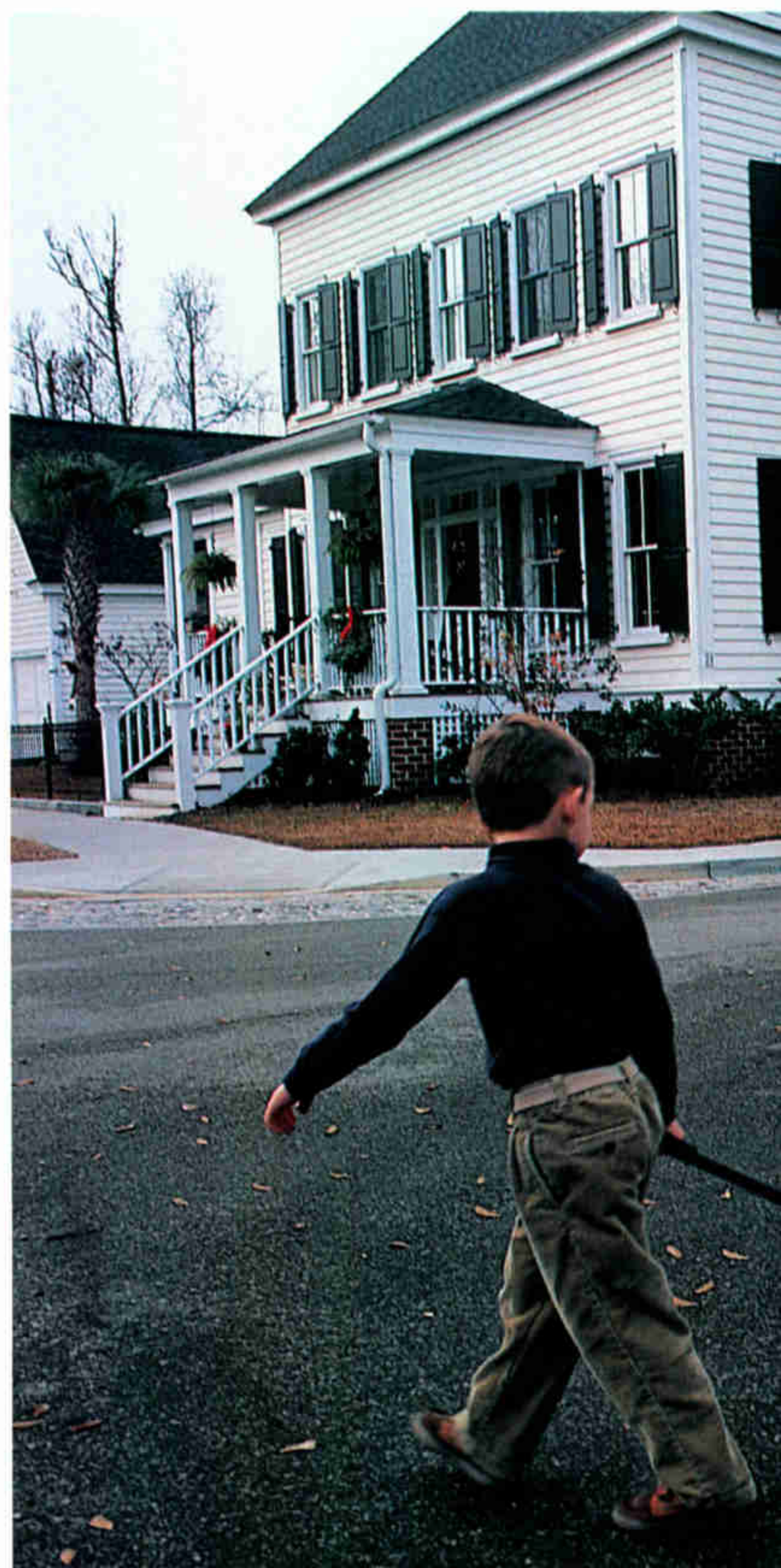
Front porches, plenty of sidewalks, more

houses (and people) on each acre—such neo-traditional elements define “new urbanist” communities like I’On Village near Charleston, South Carolina. Such solutions to sprawl aren’t cheap: Homes here start at \$300,000.

siege from a “buffalo-hunter mentality” inserting “cancerous cells of unmentionable ugliness into our rural landscape.” The legislature agreed and enacted a law mandating urban-growth boundaries for Oregon’s 240 cities. Development was to be contained inside the boundaries. Outside the boundaries, farmland and forestland were to be protected by zoning, the minimum lot size set at 80 acres.

As a result of the rural zoning program, some 25 million acres of privately owned farmland and forestland are now shielded from sprawl throughout the state. There’s no way you can make a subdivision out of houses on 80-acre lots.

“**O**REGONIANS HATE two things,” Mike Burton was saying. “They hate sprawl. And they hate density.” Burton is the executive officer of Metro, Portland’s metropolitan planning agency and the nation’s first (and, so far, only) popularly elected regional government. Metro oversees land-use plans and the urban-growth boundary that encompasses 24 cities, including Portland, in the three-county region. So when Burton speaks of people hating both sprawl and



within any city in the United States, to a river-front greenway named in honor of the late Tom McCall.

Some critics, mostly homebuilders, contend that Portland's growth boundary is riddled with flaws, that it hasn't been as flexible as the law intended, that it has raised housing prices substantially. But defenders of the system say it's the region's hot high-tech economy that's inflating the housing market. And even with that, they say, it is still less expensive to live in Portland than in San Francisco or Los Angeles, which do not have urban-growth boundaries.

From downtown Portland I rode the MAX

(the Metropolitan Area Express aboveground light-rail system) out to the western suburbs to take a peek at a place I'd been hearing a lot about, a place called Orenco Station. MAX has 33 miles of light-rail track, and the idea at Metro is to use MAX as a magnet for new residential and commercial development, all within the growth boundary and all within walking distance of a light-rail station. Orenco is one of those stations.

From the station the walk to town center is a long quarter mile. You have the feeling, as you approach across an open field, that you are about to enter a village stylishly snatched from the 19th century. There are cottages and bungalows and Main Street shops with bay

SOME PEOPLE CALL IT SMART GROWTH.





CLASH ON THE GREEN LINE

Cloaking themselves in bucolic names like Valley Springs or patriotic ones like Anthem, subdivisions advance on open space, which preservationists still rally to defend. In Northern Virginia, development not only devours farmland (right), it threatens historic battlefields too—mobilizing Civil War reenactors (above) to raise money to help preserve the past. Near Tucson, Arizona, cars and power lines often injure or kill birds like the Harris's hawk, but wildlife rehabilitators nurse survivors back to health (top right). At a nursery outside Phoenix, saguaro cactuses tagged for transplantation (top) await final relocation out of sprawl's way—at least for now.



windows. When the community's 200 acres are fully developed, there will be 1,800 units of mixed housing types, including home-office town houses, lofts, and rental apartments.

But just as there are those who would criticize Portland for being less than perfect, so can one also hear groans that Orenco and other so-called new urbanist experiments are simply attempts to disguise America's flight to the suburbs with a new suit of clothes.

OVER THE YEARS, I became addicted to reading the country through an airplane window. It is a habit I acquired before jet engines took us higher and faster than propellers could, before we began to lose, for any number of unearthly reasons, the visibility one would expect from a cloudless sky. Still, the visibility was pretty good the last time a jetliner lifted me out of Chicago's O'Hare International Airport. I could see the gleaming office towers down in the Loop and the big blue lake and the suburbs sprawling north. The suburbs looked gray.

I had been down there where the gray begins to get green a day or two before, to check out another new railside community called Prairie Crossing. This one is a bit different from Oregon's mixed-use Orenco Station. This one features roomy frame houses with rocking chair porches clustered around or within more than 350 acres of open space, including an organic farm, a swimmable lake, a restored prairie, and—in place of the concrete gutters and detention basins of a conventional development—a network of grassy swales and cattail marshes to filter the storm-water runoff.

Once upon a time the acres at Prairie Crossing might have been developed with conventional homes and non-native landscaping. But along came Victoria and George Ranney, Jr., with a better idea. Victoria Ranney is a conservation and cultural activist who edited a volume of the papers of Frederick Law Olmsted and who appears to see the land through Olmstedian eyes. George Ranney is president of Chicago Metropolis 2020, a group of business and civic leaders seeking to make some regional sense out of the chaos of Greater Chicago's 1,200 disjointed political jurisdictions.

Among the Ranneys' guiding principles for Prairie Crossing is a

“THERE'S NO END IN SIGHT... WE JUST KEEP MOVING... FARTHER OUT UNTIL ONE OF THESE DAYS WE'LL ALL BE RUBBING ELBOWS.”

statement on economic and racial diversity. It holds that “a mix of incomes and races is essential to the future of our society” and expresses an intent to keep prices down “so that some homes will be within the range of families needing affordable housing.” Several African-American families have purchased homes in Prairie Crossing, and the community has done far better on the racial diversity scorecard than many of its neighboring subdivisions. Its homes, however, sell in the range of \$270,000 to \$428,000—hardly affordable to lower- and middle-income families.

When the Ranneys pursued the economic side of their diversity principle and presented a plan that included garage apartments, they hit a stone wall. Officials in Grayslake, Illinois, with permitting authority over Prairie Crossing, resisted the idea of any apartments. So did some of the Crossing's own residents, fearing that apartments might lower the value of their homes. And perhaps there was something else, some kind of unspoken distress, a glimpse through that crack that has never been fixed in the picture window of the American dream: the dread of living next door to a cultural stranger, to a person of noticeably lesser means.

I was mulling the issue of affordable housing as the plane from O'Hare began its wide turn east toward the lake. I was thinking of how, all too often in cities like Chicago and Cincinnati, efforts to make over the inner-ring neighborhoods only reduce what little affordable housing there is. A renovated brownstone downtown may look good to the empty nester who is sick of vehicular life in the suburbs.

But where does the dislocated downtowner of lesser means go when he cannot afford to buy into that gentrified brownstone? Move to a new subdivision in the suburbs? Can't often afford *that*.

MORE ON OUR WEBSITE

Is halting sprawl worth giving up a big house in the burbs? Join the debate at nationalgeographic.com/ngm/0107.

Besides, most new subdivisions don't want him.

In my earlier peregrinations through Deerfield Township and Mason, Ohio—those booming communities with the trophy homes and the 800 businesses strung out between the bracketing interstate highways—I had heard that the lack of affordable housing was beginning to take its toll. I remembered one of Helen Fox's colleagues telling me that the folks in the trophy homes weren't taking the low-paying

beginning to address the problem of affordable housing. In the meantime a consortium of funding partners including the federal government has decided to subsidize JobBus, an expanded reverse-commute service that buses hundreds of workers from downtown Cincinnati to Deerfield and Mason to fill the low-paying jobs the locals don't want.

And then, as my jetliner flew out over Lake Michigan, Chicago's unofficial but effective



DON JACOBSEN, NEWSDAY

A CRIME IN THE NIGHT

Radical environmentalists of the Earth

Liberation Front spray-painted this home on Long Island, New York, and burned several others. "The Earth isn't dying, it's being killed," says a communiqué from the group, "and those who are killing it have names and addresses."

jobs. "You go into the supermarket and stand in line behind a dozen people," said Tracy Molitors. "And why? The store can't hire enough cashiers to man the empty checkout slots. You see 'Help Wanted' signs all over the place."

Officials in Warren County say that they are

urban-growth boundary, I remembered George Ranney saying, "Sooner or later it has to come. People have to live closer to their jobs. We've simply got to have housing that's affordable to the workforce where it works."

Then I heard another voice. It was Tracy Molitors, speaking to my memory of our meeting in a kitchen in Mason, Ohio. I had asked her where this national experience called sprawl was going to end. And she said, "End? Why there's no end in sight, the way it's going. We just keep moving farther and farther out until one of these days we'll all be rubbing elbows. All the way across America."

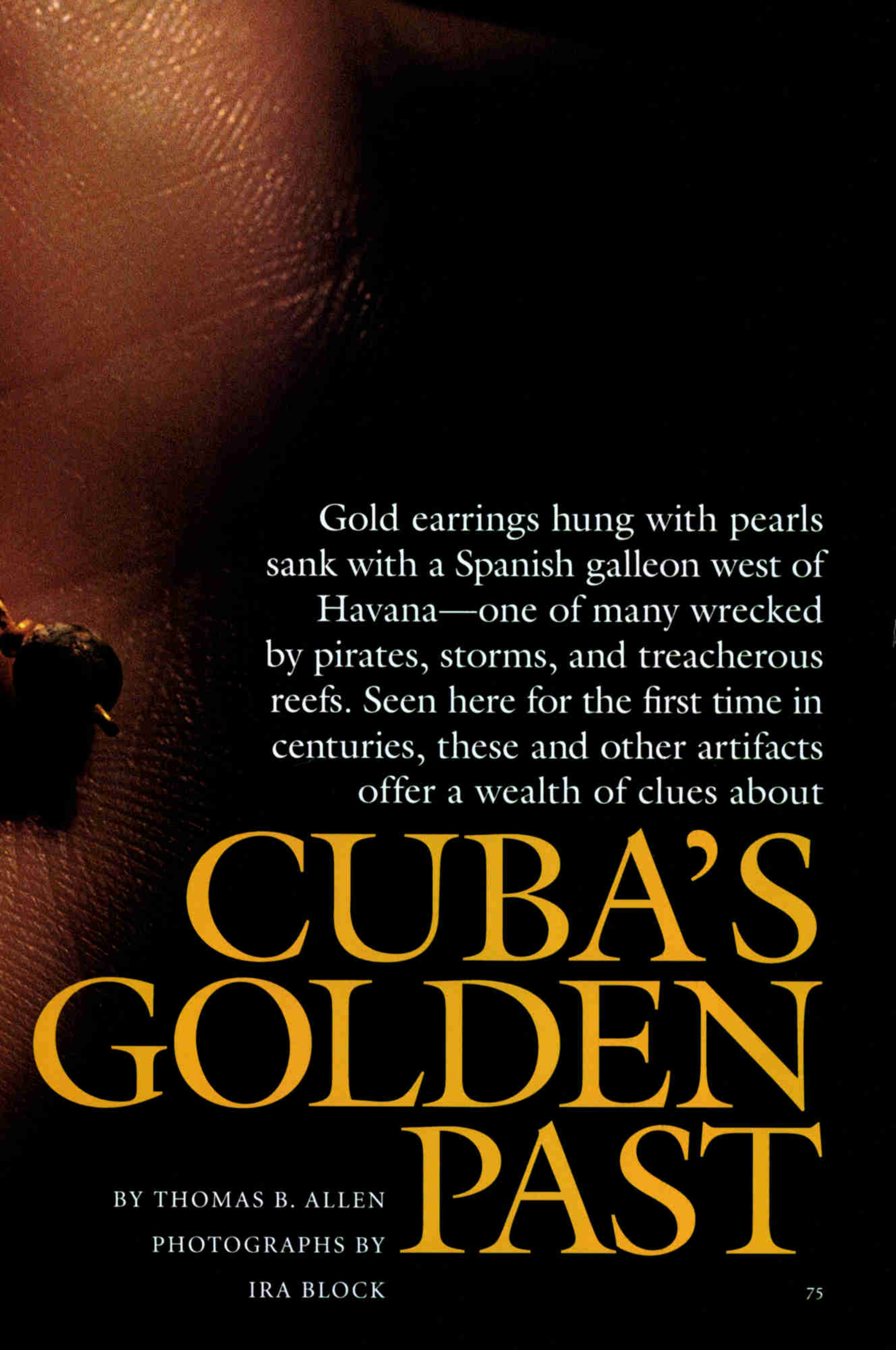
**0%
DOWN**





OWN NOW, PAY LATER: NEAR ATLANTA, GEORGIA





Gold earrings hung with pearls
sank with a Spanish galleon west of
Havana—one of many wrecked
by pirates, storms, and treacherous
reefs. Seen here for the first time in
centuries, these and other artifacts
offer a wealth of clues about

CUBA'S GOLDEN PAST

BY THOMAS B. ALLEN

PHOTOGRAPHS BY

IRA BLOCK

A glittering fortune *in gold and silver*

has been recovered from the seafloor. Treasures shipped from the New World to Seville by way of Cuba also included luxuries such as exotic feathers and rare woods that have long since perished.

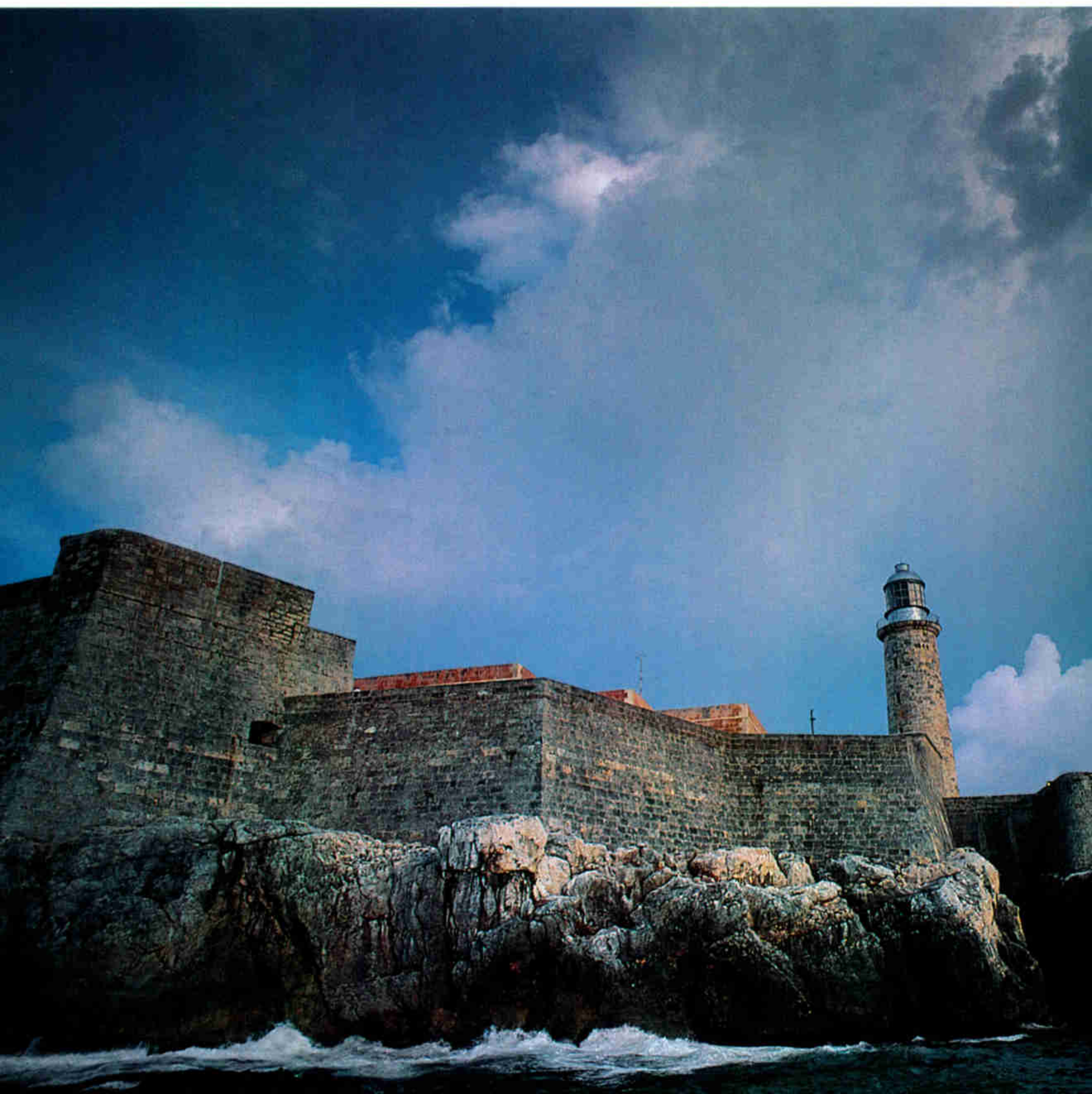




IN A SQUAT WHITE BUILDING on the Havana waterfront an armed guard silently swings open the door of the vault. There, bathed in sudden light, gleam bars of gold, gold chains, gold coins, gold beads, gold toothpicks. Nearby are silver disks the size of platters and little piles of emeralds, opals, pearls, sapphires. Once symbols of Spain's wealth and royal power, these treasures, plucked from the seafloor by government divers, now belong to the people of Cuba.

I leave the vault, and as the guard closes the door, a marine archaeologist asks if I want to see anything else. As an example he shows me an astrolabe, a navigation tool that preceded the sextant. Few have survived. "We have three of the oldest known," he says. He directs me to a paper on astrolabes written by a Cuban colleague, who quoted a 16th-century instruction: "He who wants to take the sun with an astrolabe at sea, must be seated near the main mast, the place where the boat oscillates the least and is quiet."

I want to take the measure of Cuba's past, so I tell the archaeologist I would like to go to the place where the plain things are. I am here not



only to see treasures that glitter but also to see and touch objects that illumine moments of the past. Smiling, he takes me into storage rooms where he and other archaeologists preserve cargoes from four centuries of wrecks. Jumbled on these shelves is the stuff of Cuba's long reign as countinghouse and command center for Spain's New World colonies.

I see knickknacks destined for one of the annual 18th-century trade fairs, where Cubans bought imports from Spain. I also see, pallid from centuries in the sea, dozens of little painted ceramic dogs, lions, cats, and deer later shipped from England. Stacked nearby are sets of dinner dishes, tankards, an hourglass, a bottle of very old Spanish wine.

On another day, in fading light, I walk the ramparts of El Morro, its lighthouse standing tall over Havana's harbor. The old fortress, by day a warren of tourist stops, changes by night, looming deeper into the shadows of Havana's past. As torches light the darkness, I watch Cuban soldiers, costumed as 18th-century Spanish sentries, march along the ramparts of the Castillo de San Carlos de la Cabaña and fire a cannon that salutes the end of day. In Spanish times the cannon signaled

the closing of the city gates and the drawing of a great chain across the harbor. Now the nightly ritual keeps open the sea lane of memory between colonial past and present nationhood.

Near the waterfront of Old Havana stands the Palace of the Captains General. Once the headquarters of the Spanish bureaucracy that governed Cuba, the palace now is the Museum of the City. Light and shadow play along its walls of coral limestone. Royal palms rustle in its lush courtyard. Up a stone stairway a gallery leads to the spacious office of Eusebio Leal Spengler, historian of the city of Havana and preserver of its past. A slight, precise man in a well-tailored dark suit, he is the obvious ruler of the palace.

We had hardly shaken hands before he began rapidly talking about Havana, a city he sees simultaneously in past and present. The jewels I had viewed in the vault were about to become part of the treasure he guards for Cuba. He has selected an old fort to be their new home. "This," he said with a sweep of his hand, "is the city that changed history. Because of a decision by Philip II all ships had to gather here to carry treasure back to Spain. And what treasure! Silk and aromatic wood from China. Emeralds, silver."

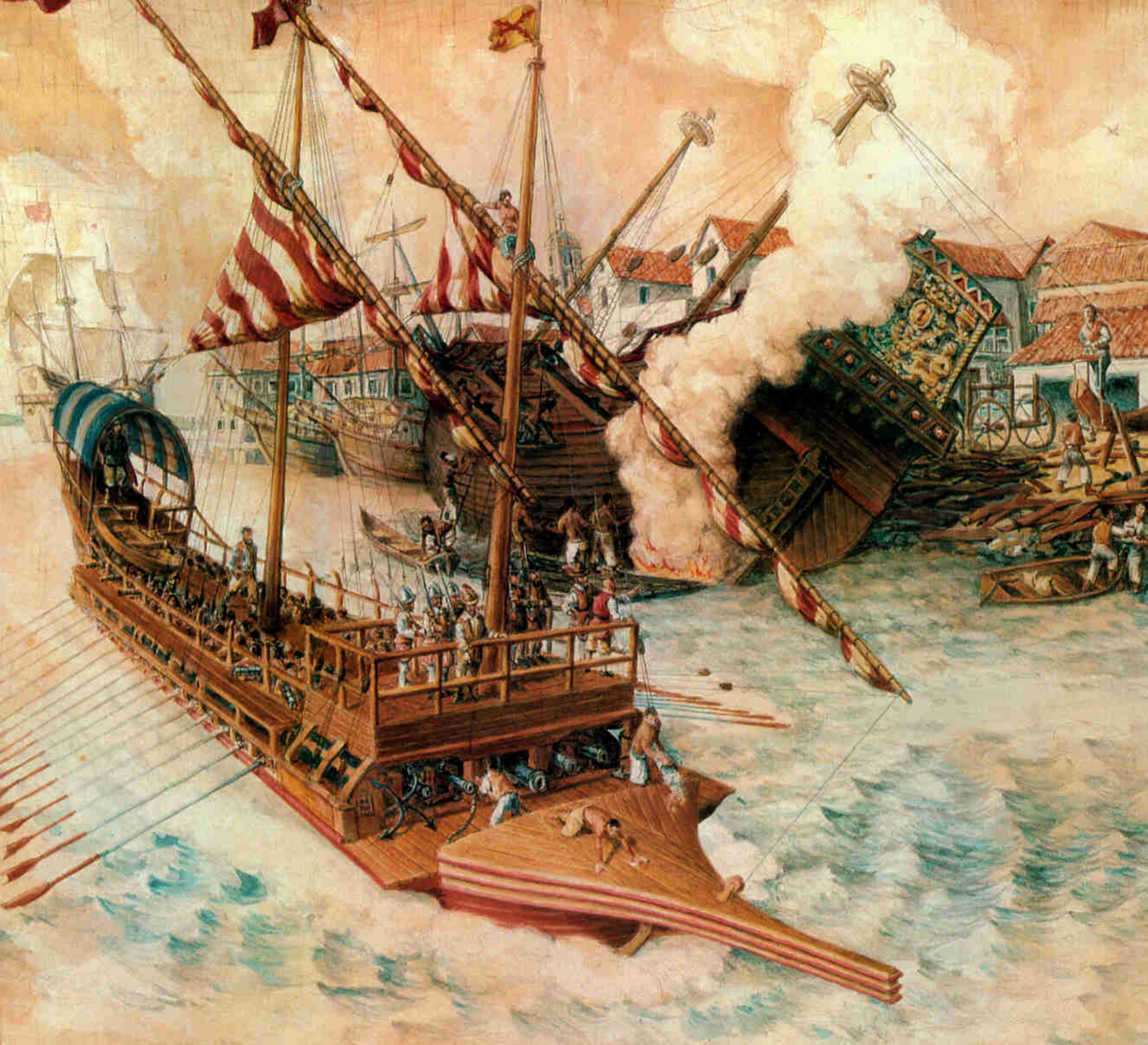
Philip II, Spain's king from 1556 to 1598, reigned over an empire on which the sun never set, a realm extending from the Philippines to the New World. Spain's control of Cuba lasted 388 years, ending on January 1, 1899, when Spain's flag flew for the last time over the building in which we sat. Although Leal Spengler cherishes that moment in 1899, he returned again and again to the golden age, "when the riches of America flowed to Spain."



Submerged for more than 400 years off Cuba's northwest coast, a gold brooch has lost none of its luster. Ships laden with the riches of Mexico and South America gathered in Havana to take on supplies before setting off for Spain in a convoy. In port the Castillo de los Tres Reyes del Morro (left) stood guard with walls ten feet thick. At sea, warships protected the fleet from plunderers.

ALL ARTIFACTS COURTESY OFFICE OF THE HISTORIAN OF THE CITY OF HAVANA UNLESS OTHERWISE NOTED





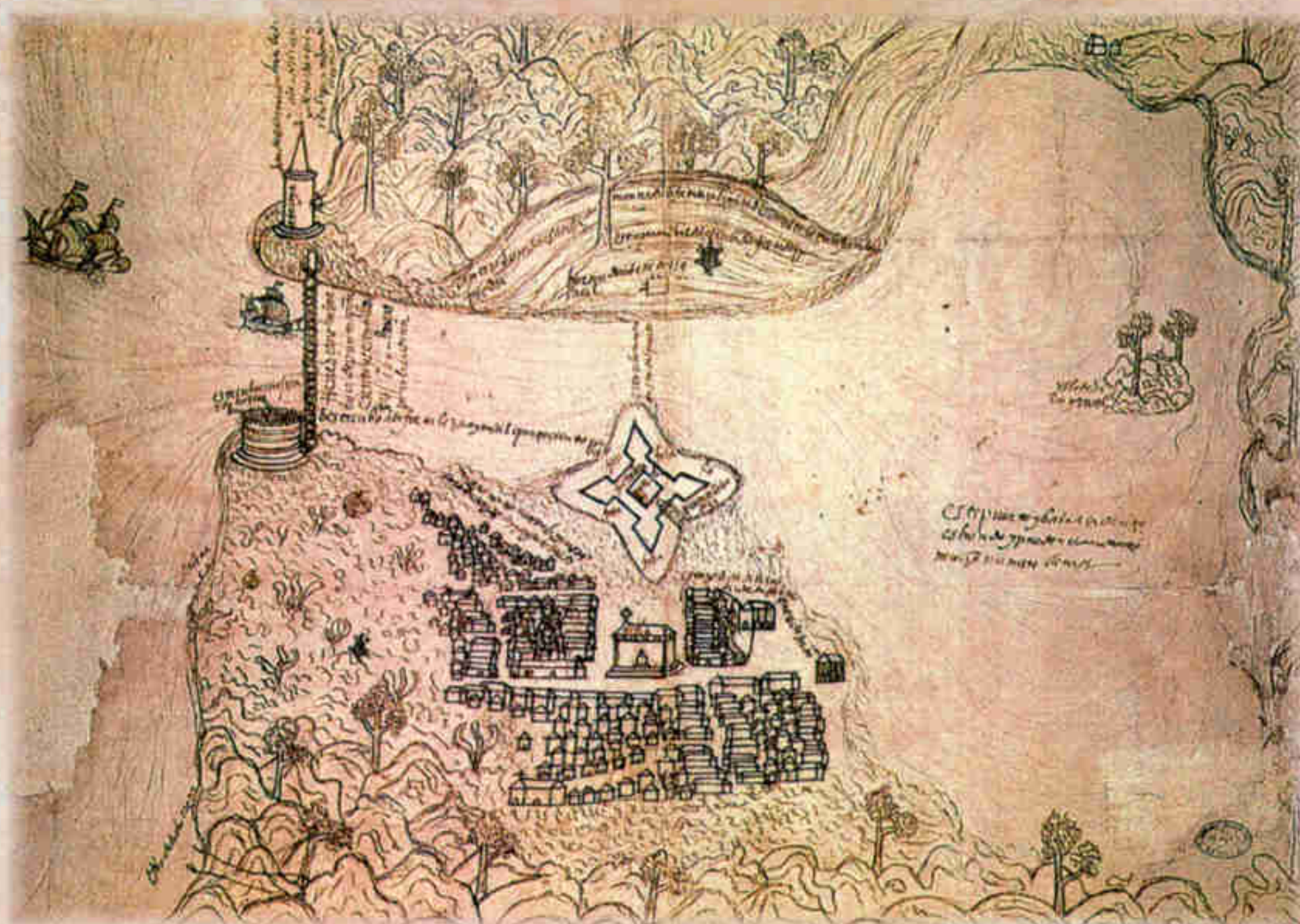
With one of the world's finest harbors, Havana became Spain's primary naval base in the Caribbean. Perhaps as early as the mid-1500s a chain was drawn across the mouth to help protect the young settlement (opposite).

FOR WHAT HAPPENED to some of those riches, I turned to the work of Alfredo Díaz Gámez, who as a numismatist finds the past in coins. Here's a lesson in history from just one little silver coin: It began circulating in the New World in 1505, launching the use of Spanish coins for worldwide trade. Eventually silver reals (ray-ALLS)—“pieces of eight” minted in Mexico—became a standard international currency and remained legal tender in the United States until 1857.

The 1505 coin is one of 13,392, the largest hoard of intact 16th-century coins ever found in the Western Hemisphere. They came from a ship torn apart by jagged reefs off Cuba.

Divers for Carisub, the Cuban government's marine archaeology organization, showed me finds from a ship that sank at the end of the 17th century. Searching in vain for treasure, they had found instead the stuff of everyday life: brass buckles, a snuffbox with a little crescent moon that turned the lock, a clay pipe, a pewter spoon, a pewter dish decorated with a rose, an enema syringe.

Another wreck remained unnamed until old records linked it to the *Nuestra Señora del Rosario*, lost in 1590. The best clue was a Spanish



GENERAL ARCHIVES OF THE INDIES, SEVILLE (ABOVE); NATIONAL GEOGRAPHIC ARTIST CHRISTOPHER A. KLEIN

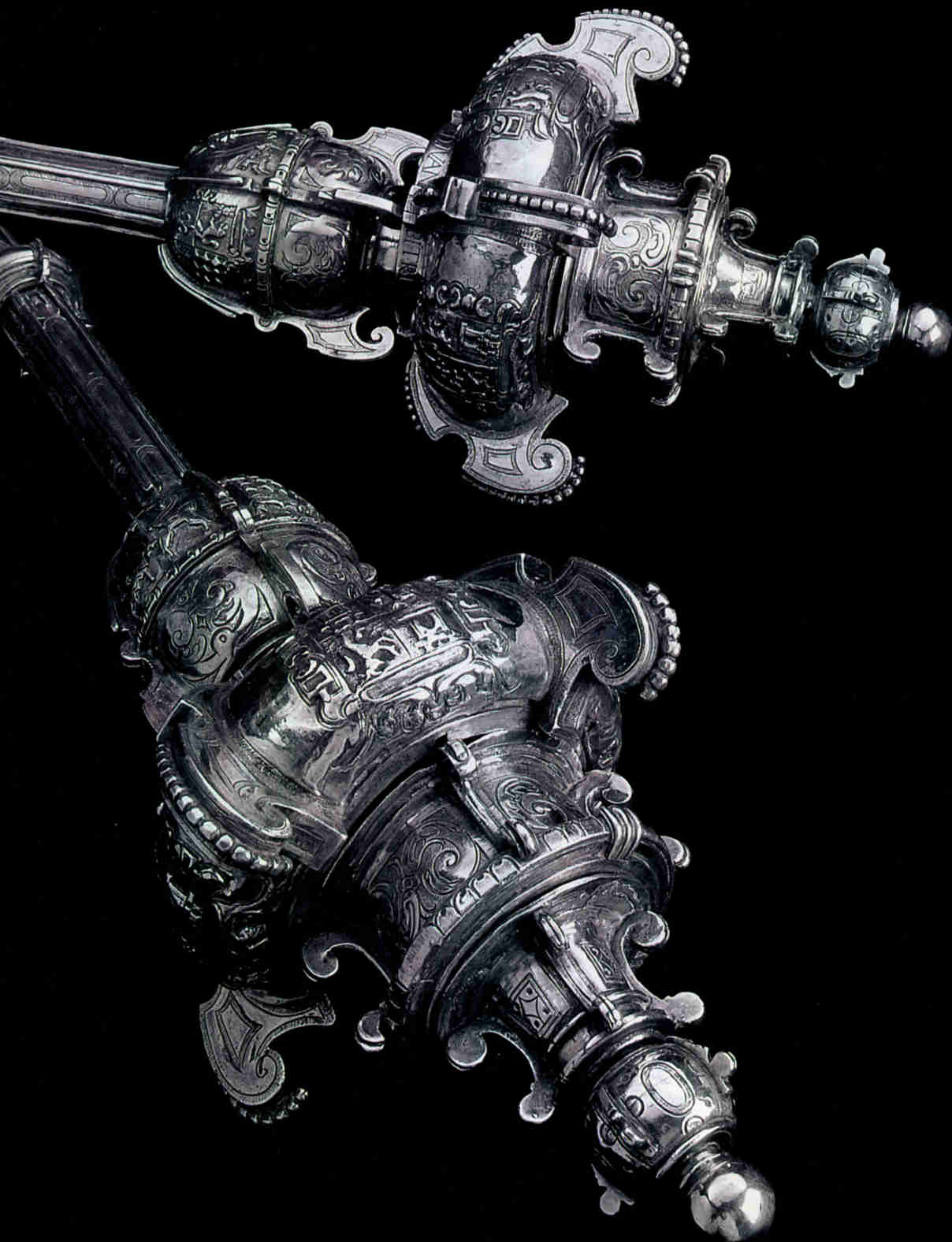
Well defended by forts half a century later, a city of 20,000 bustled around the shipyard. On the waterfront (above, counterclockwise from right) workers might fit a merchant ship with masts cut from a nearby forest, build a new galleon, and clean the bottom of a galleon already in use. A galera, or rowed galley made for ramming, heads out to patrol the coast.

Ceremonial maces, *crafted by mestizo artist*

Juan Díaz in 1631, were among the first fine silver pieces produced

in Havana. Displayed during town council meetings, they reflected

the city's growing wealth and status.



court transcript containing testimony from Jorge Soler, an artillery sergeant who witnessed the sinking of the *Rosario*. He said that two pirate ships attacked the ship. Shattered by artillery and musket fire, she headed for shore, where, abandoned by both her crew and the pirates, she sank at a place described by Soler as “a key that is at the end of the Organos towards the west.” Archaeologists determined that this was a long reef off northwestern Cuba.

Carisub divers hunted there in waters about 20 feet deep. At one spot their magnetometers indicated pieces of iron shrouded by coral. Convinced they had found the *Rosario*, they set up a grid and plotted their finds. Much of the wreckage lay under tons of ballast and a type of coral that had grown rapidly enough to protect the wood from shipworms. The divers removed the coral with air hammers, freeing pieces of wood, spikes, and wood pins. The wreck was similar in size to the *Rosario*, and two anchors were the kind carried by ships like her.

Divers brought up a gold chain, a gold earring, a gold ring, rosary beads, three emeralds, and some silver jugs. They also found pig bones and the carapaces of sea turtles—the food of sailors who worked on ships like the *Rosario*. The cannon and musket bullets also seemed right, as did the ship’s timbers and coins from the time of Philip II.

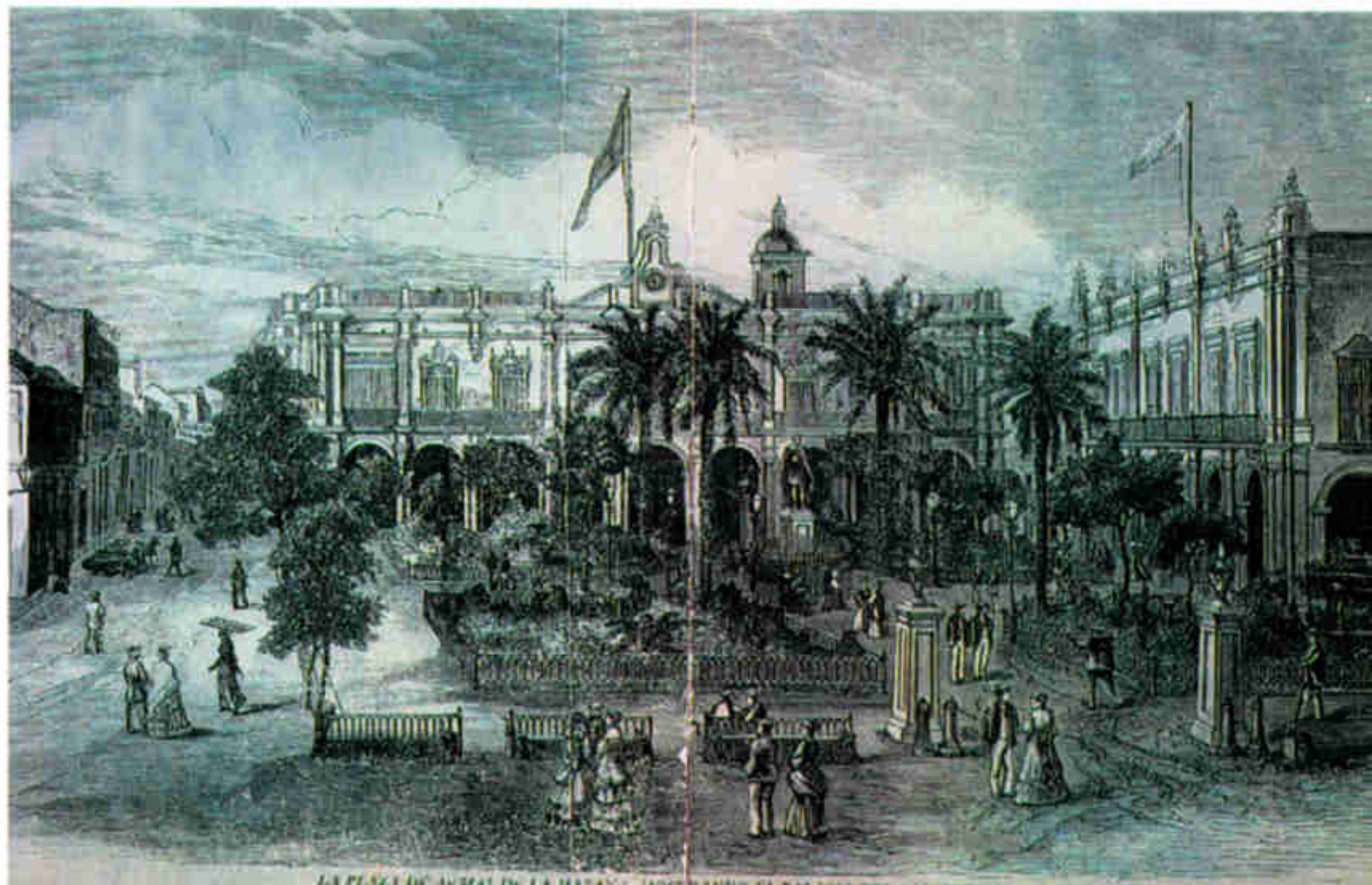
Then Díaz Gámez noticed that a few silver coins bore a tiny R with a peculiar curved leg. He recognized the R as an assayer’s mark used only on coins minted between 1605 and 1613. The wreck could not be the *Rosario* of 1590, so this one remains a wreck without a name.

When a ship went down, her name often vanished with her. The sea soon destroyed manifests, logs, and other papers. Shipworms devoured wooden objects that could be identifying. Marine archaeologists can still learn from wrecks, however. Pottery and glass endure to tell of the past, as do gold and silver. All are valuable to the archaeologist, but it is the glitter of gold and silver that lures the treasure hunter.

Diego Velázquez de Cuéllar, who conquered Cuba in 1511, lusted for gold, wresting it from natives and working them to death to find more. A friar described Velázquez as a man “richer than anyone, with much experience in shedding or helping to shed the blood of these unfortunate folk.” In search of more gold he dispatched his kinsman and fellow conquistador, Hernán Cortés, to Mexico.

After vanquishing the Aztec, Cortés sent back to Spain, in his first shipment, treasure that included two gold necklaces—one studded with 185 emeralds, the other with 172 emeralds and 10 pearls. That was the beginning of Spain’s system for acquiring New World gold: Steal it, stamp it, ship it. The crown at first took half the gold and silver; the royal share later dropped to 30 percent, then 20 percent, and in a few cases 10 percent. Not all gold went to the king. Stamped on the disks of gold I saw in the vault were seals indicating which ones were to go to churches and religious treasuries.

Havana’s oldest square, the Plaza de Armas was still the place to be seen in 1869, when this print appeared in Harper’s Weekly. Each evening people showed off their finery in front of the Palace of the Captains General, home of the Spanish governor. Revolution was in the air though. Cuba gained its freedom from Spain in 1899.



CUBA WAS A MAGNET—and a graveyard—for ships. Hundreds sank in Cuban waters, victims of pirates, war, storms, or bad navigation. Raiders carried off their loot, but many cargoes went down with the ships. These are the ships sought today by Cuba, which has enlisted both its own archaeologists and foreign commercial treasure hunters. The archaeologists search for history. The treasure hunters seek their fortunes, which they must share with the Cuban government. These hunters get exclusive rights to certain areas. Fifty percent of the appraised value of their finds goes to the government. From the remaining 50 percent they subtract their expenses. Then a deal is made over a further split with the government. The treasure hunters hope to find the richest prize in Cuban seas: ships of the Spanish treasure fleets, which carried New World gold, silver, and gems to the royal court of Spain.

The treasure fleets, called *flotas*, first sailed into history and legend in the 16th century, when Spain's powerful, royally controlled Casa de Contratación (House of Trade) ordered merchant ships to travel in convoy, guarded by armed warships. Colonists could legally trade only

GOING FOR THE GOLD

Divers explore a mystery ship

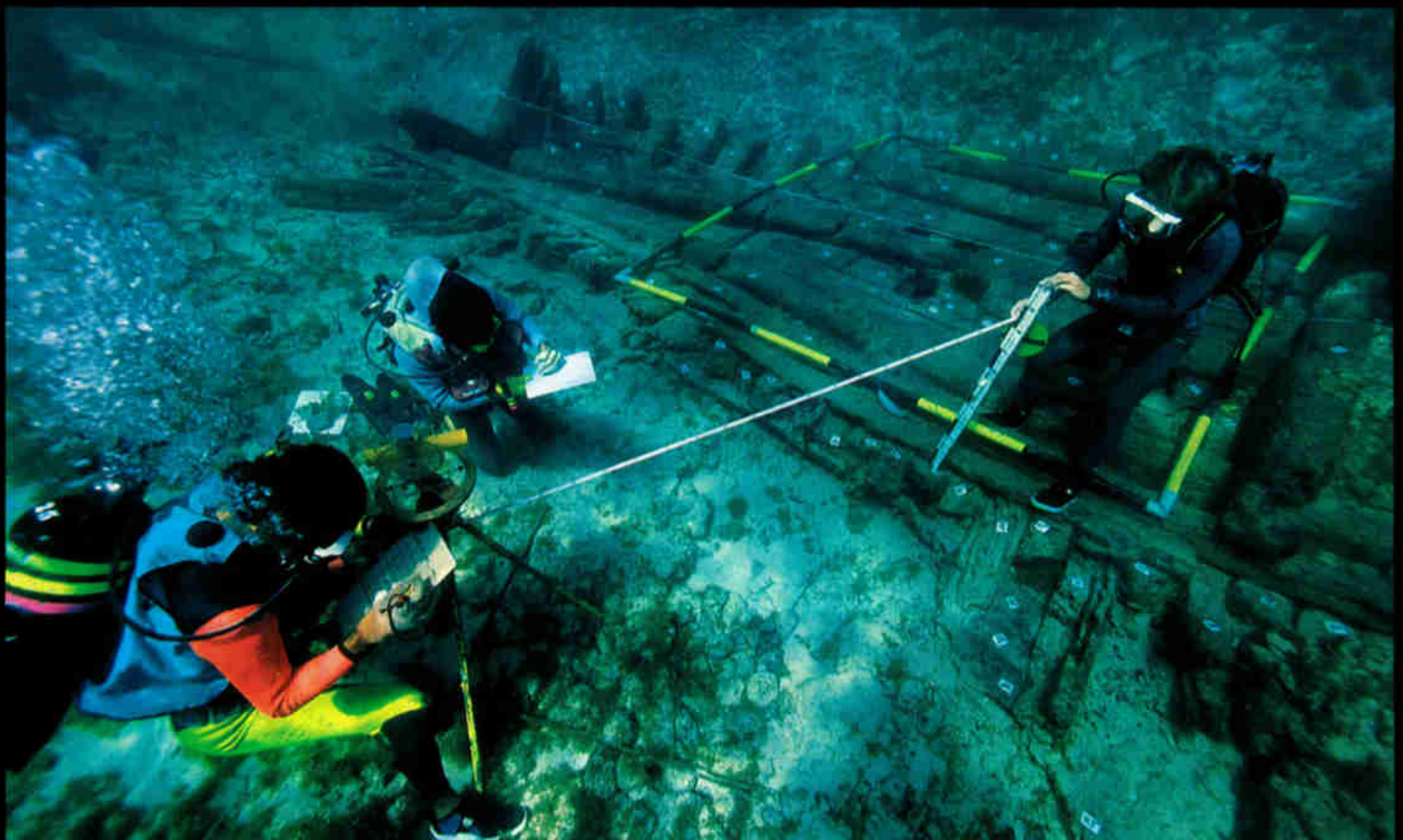
In crystal clear water less than 20 feet deep Cuban archaeologists investigate the remains of an early 17th-century galleon. Time and tide have erased her original name. Now she is known only as Fuxa, after the reef where she sank.

Much of her cargo was likely salvaged immediately, but what remained

gives a tantalizing hint of the treasure she transported (right). The real prize for historians, however, is the ship itself. Divers removed nearly 30 tons of coral to reveal an extraordinarily well preserved wooden hull. After surveying it (below), they moved it timber by timber to a lab for conservation.



BOTH BY JONATHAN BLAIR



with merchantmen cleared by the House of Trade. Most of the authorized trade was bestowed upon the flota, which numbered from 30 to 90 ships, depending on the flow of trade and the size of the naval escort.

In a typical year the first of the two annual treasure fleets left Spain in spring and entered the Caribbean near the island of Margarita, off Venezuela—a source of pearls and a frequent target of pirates. Here the flota usually split in two, following courses that touched much of the Spanish New World. One convoy stopped at ports along the Spanish Main, as the English called the northern coast of South America and the Caribbean islands. Colonists, forbidden to manufacture anything, had to buy even such ordinary items as cutlery, tools, and religious medals. They also had to depend upon Spain for European wine, cloth, and paper.

Other ships carrying similar cargoes sailed into Cartagena, Colombia, and then west to Portobelo, Panama, the collecting point for the silver that flowed in from the mines of Peru. One day a Dominican friar in Portobelo counted 200 mules laden with silver, which was stacked in the marketplace “like heaps of stones in the street.”

The merchant ships eventually rendezvoused in Cartagena to spend the winter. Ships of the second flota, meanwhile, had sailed to Veracruz, Mexico, where they emptied their holds for sale at a trade fair that drew buyers from all over Spanish America.

Crewmen set up the fair, hauling sails ashore and using them to shade booths from the tropical sun. Tradesmen wore hatbands of pearl and shirts of silk. Women of every class, including slaves, showed off jeweled earrings and pearl bracelets. Crafty colonists, flouting royal regulations, could make themselves rich with trade and even become counts or marquises—if they paid off the right officials.

Over the winter, while the ships were fitted out for the return voyage, their next cargo was moving by mule across Mexico from gold and silver mines worked by enslaved natives. At Veracruz ships also picked up the goods of Spain’s lucrative trade in the Far East. Silks, spices, dyes, and porcelain had made their way by galleon to Manila, by galleon again from there to Acapulco, Mexico, and then by mule train to Veracruz.

In late summer the merchant ships and war galleons sailed to Havana’s well-fortified harbor to form the treasure fleet. Walking around Old Havana, I passed a police precinct housed in what looked like an old fort. In the darkening shadows of those narrow streets the past seemed to lurk around every corner. Here once walked the crews of the treasure fleet, and here strutted their proud commander, the captain general.

Theoretically the captain general and his warships defended all the merchantmen against pirates. In reality storms frequently scattered the flota, making individual ships vulnerable. Pirates chose these loners to attack and loot. But Piet Heyn—to the Spanish a pirate, to the Dutch a fabled admiral—was not satisfied with picking off stragglers. He wanted the whole treasure fleet.

WHEN HEYN was a young privateer in Spanish waters, he was captured and sentenced to be a galley slave. Freed in a prisoner exchange, he returned to sea and sought vengeance. In 1623 and 1626, as a Dutch admiral fighting against Spain for his homeland, he led rampages against Spanish America, sacking the Cuban port of Matanzas and capturing many ships.

(Continued on page 89)



Minted in Spain as well as in the colonies, gold and silver coins have helped date several wrecks explored recently in Cuban waters. In the case of Fuxa, divers first thought they had found a ship known to have sunk in 1590, the Rosario. However, coins found with the wreck proved to be of later date.





Precious cargo *from the 16th and 17th centuries comes in a dazzling array of shapes and sizes in 22-karat gold: an earring from Colombia's Sinú culture (above); part of a small disk stamped by assayers, tax officials, or owners (below); and similarly stamped bars and a chain 18 inches long with implements for cleaning ears and nails and picking teeth.*





Officials in Havana, who feared Heyn more than any other foe, kept sharp watch for him, especially when a treasure fleet was about to sail for Spain. On August 4, 1628, Heyn and his ships lay off Cuba, not quite sure whether the treasure fleet's Mexican component—the Dutch called it the “silver fleet”—had left for Havana to link up with the rest of the flota. Spanish scout vessels spotted the Dutch and sent swift courier ships to Veracruz to warn Juan de Benavides, captain general of the treasure fleet. But, unknown to the Spanish, Heyn had captured one of the courier ships. Now aware that his prey would soon arrive off Cuba, Heyn waited to pounce.

Juan de Benavides was an admiral who had never fought a sea battle. Scion of a wealthy family of shipbuilders, he got his appointment through influence, not skill. Benavides, shepherding about 20 ships, had left Veracruz for Havana in July but was forced back to port because of what he described as “an emergency” that had dismasted his flagship.

Finally in August he set sail again. As he neared Matanzas Bay, about 50 miles east of Havana, he saw more than 30 of Piet Heyn's warships bearing down on him. “I continued my course, resolved to die,” Benavides bravely wrote in a letter to the king. But another officer later testified that Benavides had foolishly led the fleet into the bay. In his panic Benavides grounded his own ship and all that followed.

Heyn, who had already captured nine ships of the silver fleet, pursued Benavides into the bay. Heyn and his captains anchored or grounded their ships, boarded boats manned with musketeers, and headed for the hapless Spanish ships. Firing and shouting their battle cry—“*Buena guerra*, Good war!”—the Dutch swarmed aboard Benavides's ship and the ship of Adm. Don Juan de Leoz, second in command of the flota.

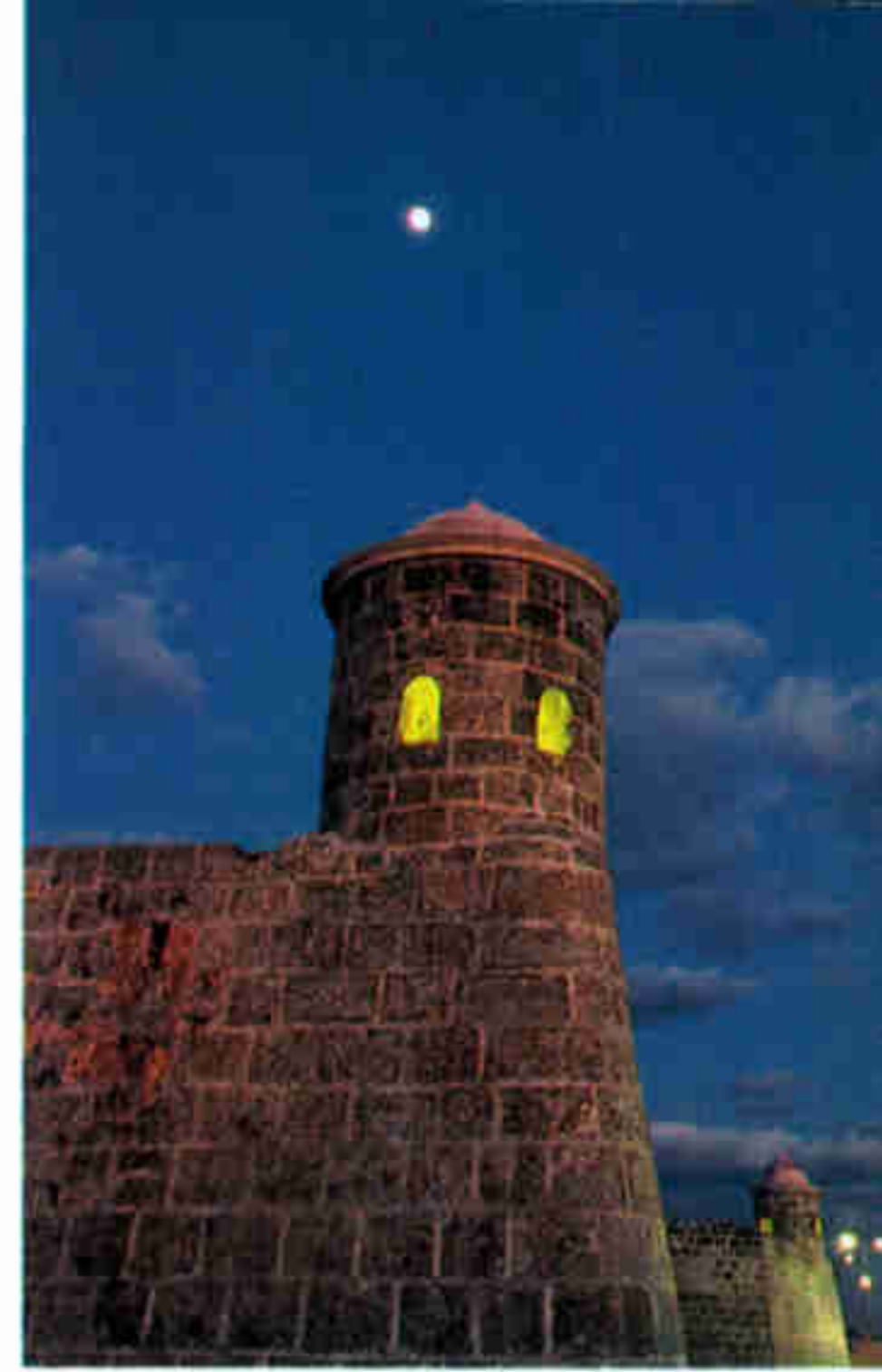
“I jumped into a boat,” Benavides later recounted, claiming he had arranged in vain for his ship to be set afire in his absence. Leoz, seeing his ship boarded by the war-whooping Dutchmen, ran below, changed into the clothes of an ordinary sailor, and slipped in among the crewmen who already had laid down their muskets.

Heyn and his men put the Spaniards ashore and seized six Spanish ships. Day after day the Dutch sailors inventoried and transferred the “large amount of plunder present,” including 46 tons of silver—“minted reals of eight as well as bars or plates of silver and silverware.”

Benavides's flagship, so jammed with cargo that the cannon ports were obstructed, had 29 guns; Leoz's had 22. None had fired a shot. Heyn put his men aboard the six looted galleons, along with three others, and sent them off to the Netherlands in the wake of the nine he had captured earlier.

The Netherlands hailed Heyn as a hero and cast a commemorative medal from the silver. Long afterward children sang a song—“He has won the Silver Fleet, hurrah, hurrah, hurrah!” Benavides and Leoz returned to Spain in disgrace. Leoz was imprisoned for life. Benavides was tried not for loss of the treasure fleet but for cowardice. By royal decree he was marched through the streets before jeering throngs and then beheaded. Heyn did not last long as a hero. In 1629, while attacking pirates in the English Channel, a cannonball cut him in two.

The story of Heyn's triumph and Benavides's march to death are preserved in the General Archives of the Indies in Seville, Spain. Treasure searchers begin here, sifting through the voluminous records that officials kept on every flota, on every ship and every cargo. When a ship



Still vigilant, the Castillo de San Salvador de la Punta was begun in 1589 to repel enemies from Havana's harbor. Soon it will open as a museum. A recent restoration led by City Historian Eusebio Leal Spengler has prepared it to display artifacts from colonial shipwrecks, including an emerald and a collection of opals—some with knobs may have been used as buttons.

MORE ON OUR WEBSITE

Listen to author Tom Allen discuss how the magazine gained access to Cuba's rarely seen national treasures at nationalgeographic.com/ngm/0107.



Pieces of history, a bronze astrolabe and a silver pitcher help bring to light an era celebrated nightly at Havana's Castillo de San Carlos de la Cabaña. Precisely at nine, costumed soldiers fire a cannon—once the signal that the city gates had closed for the night.

disappeared, officials demanded to know why and where, although sometimes the location was no more precise than “a cannon shot from the beach.” But the searchers press on, going from document to hunch, from the shelves in Seville to the waters off Havana.

The archives, chronicling Spain's long reign in the New World, reside in rows of boxes on endless shelves in the vaulted, echoing halls of a stately 17th-century building. When I walked past those shelves and was ushered into an inner sanctum, I expected to see more parchment and royal red seals. Instead I found that most historians (and treasure hunters) were seated before computer monitors, reading old words in new form. Efficient, yes, and easier on the yellowing documents. But what romance is there in a computerized flota?

I finally got my wish to touch the past when María Antonia Colomar Albajar, vice director of the archives, brought me charts of Havana. One, drawn in 1591, its colors still bright, showed chains affixed to the harbor wall. Another, dated 1689, portrayed a harbor bristling with guns. Each house was meticulously painted—and one of them had surprised an archaeologist back in Havana.

Roger Arrazcaeta, director of Cuba's Archaeology Office, told me about that house. Destined for restoration, it stands not far from the white-washed 18th-century museum he heads in Old Havana, the Cabinet of Archaeology. While excavating beneath the house, Roger's team unearthed a “shipbuilding altar,” the stone platform on which ships were constructed. Holes spaced along the altar show where shipbuilders inserted stocks to support the keel and the skeleton of the ship. Later he found relics of an older and more elaborate shipyard east of Havana. Roger, a slim, dedicated scientist, works in a cluttered, ill-lit office. In it I saw a set of NATIONAL GEOGRAPHICS that went from the 1920s to the early days of Fidel Castro's regime.

Shipbuilding in Havana began to flourish, Roger said, after the British destroyed the Spanish Armada in 1588 and continued well into the 18th century. “Spain discovered it was cheaper to build ships here, where there were slaves,” he told me. “And they built well. When a ship was called ‘genuine built in Havana,’ a buyer knew it was a good ship. And our wood lasted twice as long as European wood.”

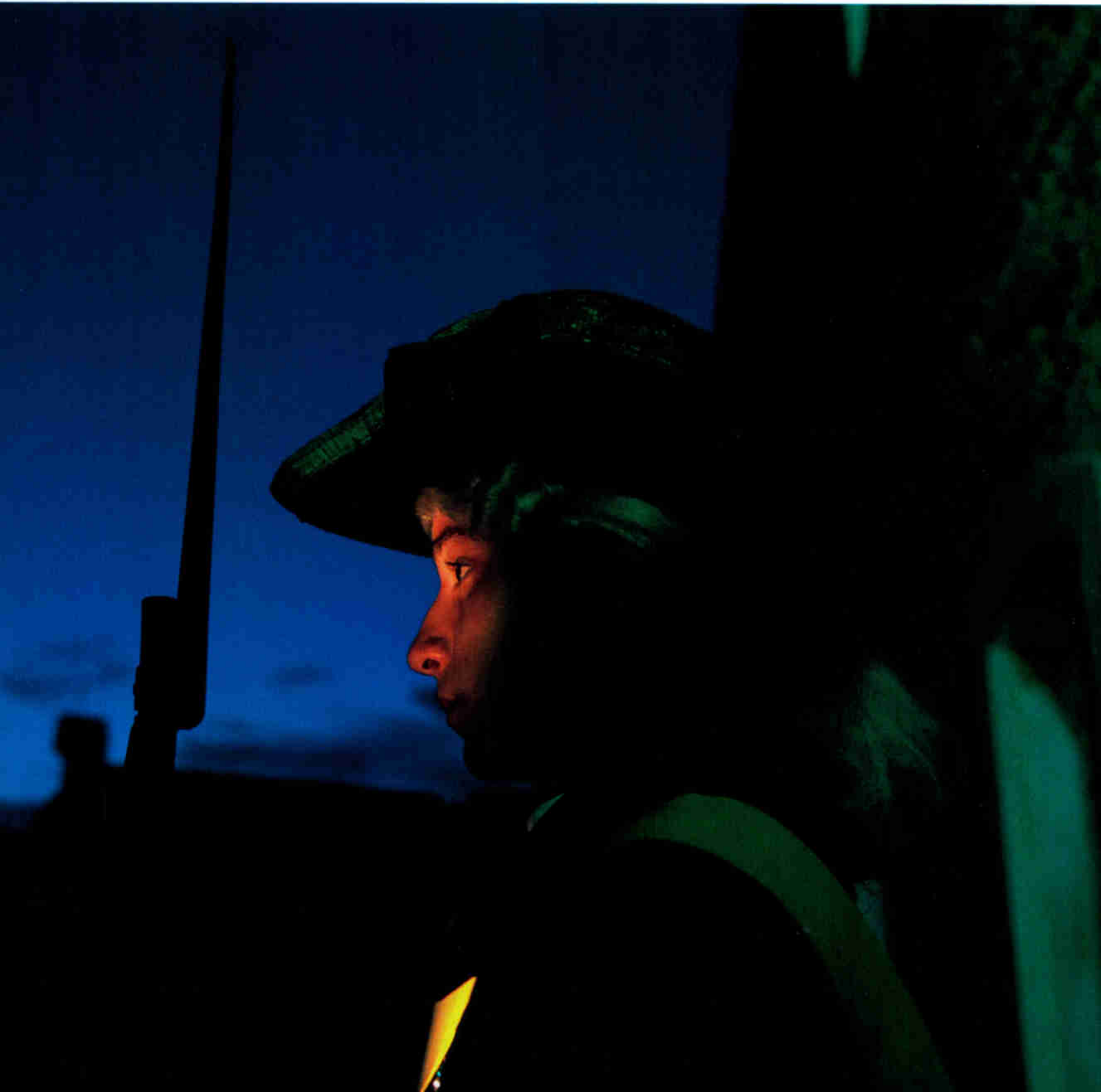
While we walked around the museum, he picked up artifacts from the dusty shelves. One was a broken pot he had found in Havana harbor. “It came from China or southern Asia,” he said. “And look at these.” He pointed to what he had found in the bottom of the pot—the remains of peaches and cherries, eaten by sailors to ward off scurvy.


Roger held up a cheap glass-and-jet necklace with a silver crucifix found during a dig that

exposed graves beneath Havana's Church of San Francisco de Paula. "People were buried by rank," he said. "Nobles near the altar, baptized black slaves in the doorways, where people walked over them, but these rules were not always followed to the letter of the word."

Roger took me up a flight of stairs to a room where layers of paint had been peeled away to reveal a long-hidden panorama of 18th-century Havana. I had read that Cuban aristocrats had adopted the styles of Spain. Now I could see them, promenading in a formal garden overlooking Havana harbor: A slave in a well-tailored blue dress attends a woman in a flowing white gown. Men in breeches and buckled shoes pay court to a woman in red. A Spanish soldier parades in a scarlet uniform.

Like the images in this mural, Spanish America by then was fading away. The gold and silver mines were giving out. The last flota sailed in 1778. Spain no longer had a monopoly. Cuba was becoming a nation. The long struggle for independence would not begin until the next century, but someday Cubans would find and claim as their own the treasures that Spain had taken away on ships sailing to their doom. □





For a half century on Monhegan Island two things have been as predictable as the tides: The mailboat Laura B. will make the 12-mile run from Port Clyde in all but a full gale, and artist Frances Kornbluth will return for the summer. Beloved by fishermen, painters, and a growing throng of tourists, the island casts a powerful spell.




WELCOME TO
MONHEGAN
ISLAND, MAINE.
NOW PLEASE,

GO
AWAY

BY CATHY NEWMAN
NATIONAL GEOGRAPHIC SENIOR WRITER

PHOTOGRAPHS BY AMY TOENSING

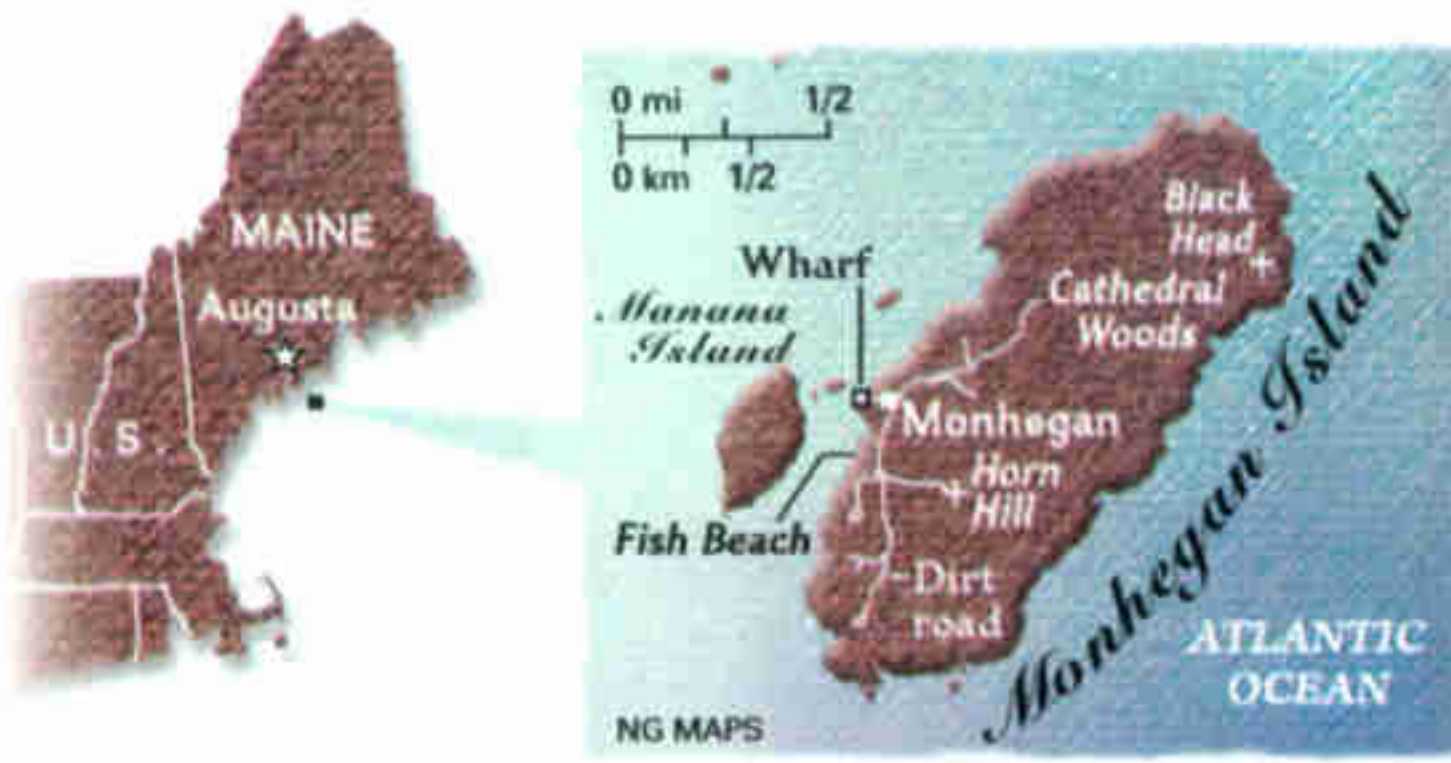




FIRST OF ALL, there are boundaries, and if you don't know where they are, you will find out soon enough. They begin with 12 miles of ocean separating Monhegan Island from the rest of Maine. They continue with a three-mile offshore perimeter marking the Monhegan Lobster Conservation Area, inside of which lobstermen from elsewhere may not intrude. They include a welcome mat in front of the cottage belonging to the former librarian. "Go Away," it reads. They end with the barrier islanders erect around themselves—an invisible, inviolable line, which if crossed would trigger red flags, a falling barometer, and the certainty of storm warnings ahead.

On my third day on Monhegan, I spoke with Sherman M. Stanley, a fisherman whose family has lived on the island for six generations. For decades Sherm was the nearest thing Monhegan had to a monarch. Before he retired, his word (and that of his brother Alfred) was law. During the Stanley reign, order prevailed. *Things got done*, people said.

Jutting 165 feet above the North Atlantic like a storm-darkened sail, Black Head, on the island's northeast shore, has served as a sailor's signpost to safe harbor for nearly 500 years.



Now 75, Sherm still carries himself with a mast-rigid carriage and an unshakable conviction that most people are damn fools.

“Tell me about the rules lobstermen live by,” I asked him. Lobster season on Monhegan runs from December 1 to June 25. There are limits on lobster size (the body, not counting the tail, must be at least three and a quarter inches long, with a five-inch maximum) and on the number of traps that may be fished (600).

“What if there is a violation?” I asked. “Say someone kept undersized lobsters or put out too many traps. What if someone from another community strayed into your waters?”

“We take care of it, if you know what I mean,” Sherm answered.

“I don’t. What do you mean?” I pressed. Lobstermen form a fraternal order of their own, and lobster wars between rival communities of fishermen often erupt. I wanted specifics.

He gave me an appraising look.

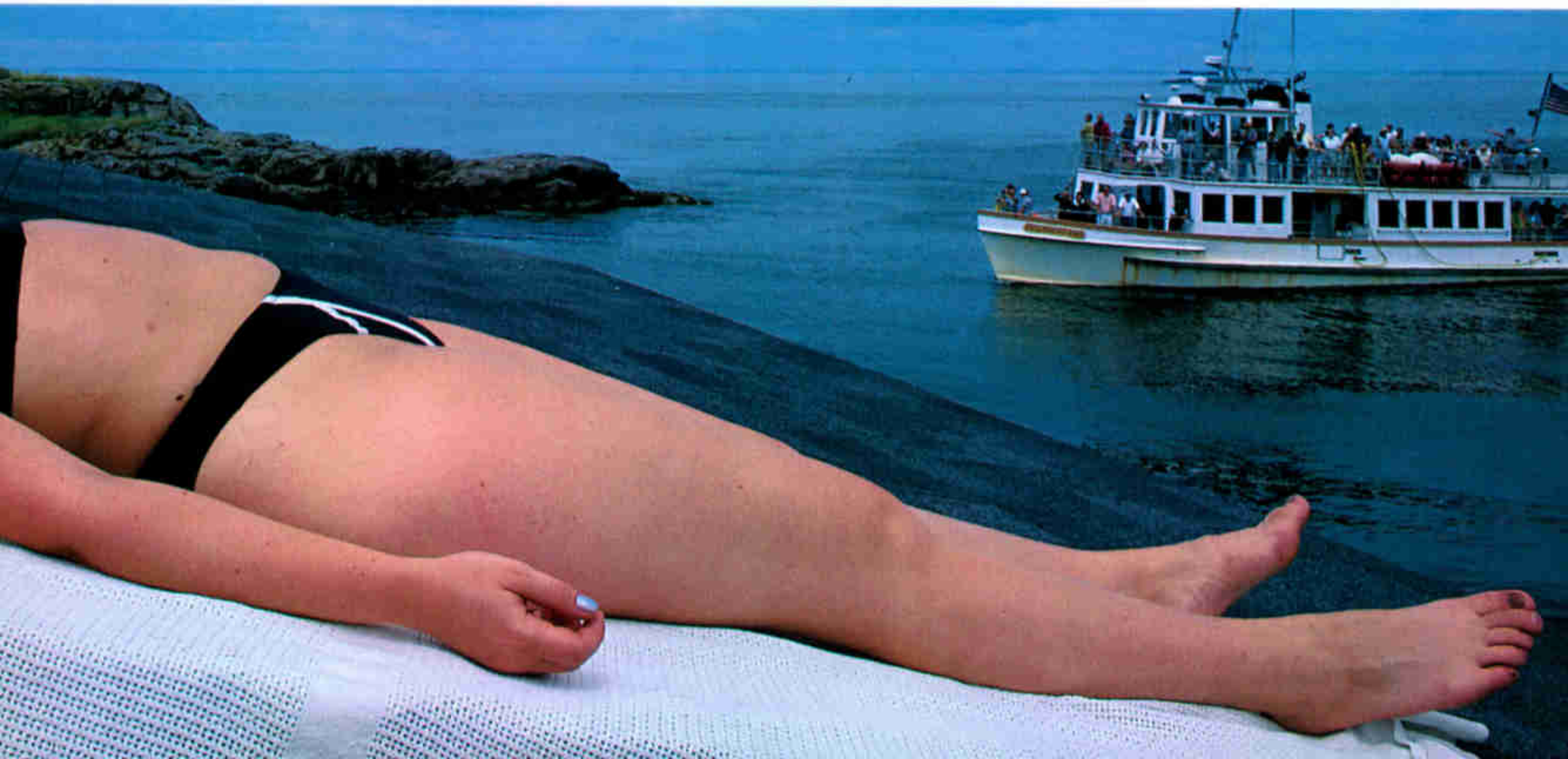
“I could tell you a lot of stories, but I won’t.”

SPREAD OUT A MARITIME CHART of Muscongus Bay, along Maine’s ragged mid-coast, and run your finger southwest by south out of Port Clyde, the tiny harbor on the tip of the St. George peninsula. Continue on, taking care to avoid the shoals of Hupper Island and Old Horse Ledge. Trace a path between Allen Island and Burnt Island, turn slightly west, head straight, and you’ll find Monhegan Island at latitude 43°45’ N, longitude 69°18’ W. Captain John Smith came in 1614 and found it a “round, high Ile,” which is pretty much how one finds it today.

Monhegan is ringed by high, dark cliffs. Its interior mixes meadow, marsh, and spruce

WINTER BRINGS SOLITUDE to the 65 year-round islanders and lobster traps to the lawn of the empty Island Inn. By summer crowds have arrived, including a sun-starved inn employee and hundreds of day-trippers.





groves so dense that light doesn't filter through, forcing trees to grow ever taller to meet the sun. Often a batting of fog covers the island. Monhegan fog is not subtle. It is a wringing-wet, gray shroud, and its appearance triggers the sob of a foghorn on Manana Island, a small hump of rock opposite Monhegan's harbor.

There are 4,613 islands off the Maine coast. At the turn of the 20th century 300 of these were populated; now Monhegan is one of 14 true island communities left. When islanders visit the mainland to shop, to visit the doctor, or simply to clear their heads, local parlance has it that they're going "inshore"—or, even,

"to America"—as if Monhegan were some offshore principality, which perhaps it is. "I'm going downtown," I overheard a woman say, by which she meant the 30 yards or so down the path to the post office, which is all there is to "downtown" except for two small grocery stores and a scattering of galleries that cater to summer tourists.

Monhegan in summer is marked by wicker rockers on wood porches and Scrabble and jigsaw puzzles with just enough pieces missing after countless seasons to make it frustrating. Ferries disgorge hundreds of day-trippers, who spend a few hours hiking the 17 miles of trails,



PICKING ONLY THE DARKEST CRANBERRIES *for their Thanksgiving feast, Winnie Murdock*

then head home, though some linger in half a dozen inns busy only in summer. The summer resident population hovers around 200, but day-trippers can add another 600 or 700 to the mix. Winter is a quiet and lonely time; the island shrinks to its bedrock population of 65.

In the unofficial hierarchy of Monhegan, day-trippers are the bottom dwellers; short-term renters rank a few notches up, superseded by the stable population of summer residents; and finally are the year-round locals, fewer than half of whom fish for lobster in winter.

In the Carina, one of the grocery stores, summer is defined by the shuffle of Texas and

Birkenstocks across the pine floor. The store offers more than a hundred varieties of wine from California, France, Chile, and Australia. It is also, for those who must, the place to buy a *New York Times* or *Wall Street Journal*. "There have been more confrontations over the last *New York Times* than anything else," says Ray Hydusik, who helps run the place. He indicates a sign: "If you can't enjoy the natural beauty of the island without the *New York Times*, the boat leaves at 12:30 and 4:30."

Ray holds a definite opinion about day-trippers. He dislikes them. Does he bite the hand that feeds him? It's not a blanket bias, he



and son Kyle forage on Manana, a deserted isle a skiff ride away that helps form Monhegan's harbor.



PAINTING A MOVING TARGET, *Jamie Wyeth captures energetic entrepreneur Kyle Murdock hawking his Dead Cat Museum to tourists. Wyeth, a seasonal resident since age 16, admires the island children. "They make do with what they have," he says.*

explains. "It is a matter of quality, not quantity. It's the ones who arrive with golf clubs or tennis rackets, wanting to know where the courses and courts are" (there are none). "Or the woman who clicked off the ferry in high heel shoes" (there are no sidewalks, only dirt roads).

Similar grumbles have been voiced for a century or as long as rusticators, as tourists were known, have visited. "I expect in ten years the island will be spoiled, for everybody except a

few of the summer folks," an old captain told a Portland newspaper in 1910. "His remark is typical," the article said. "The summer tourist is tolerated, rather than invited . . . hotels have been erected because of the demand for them rather than as a bid for company."

Monhegan is more fortunate than most other islands: Three-fourths of its land is protected by the Monhegan Associates, a land trust formed in 1954 by Ted Edison, the inventor's



son, who had a summer cottage near the lighthouse; a group of other summer residents; and locals, including Sherm Stanley, who supported the proposal among the fishermen.

“WHEN I COME HERE, I become who I really am,” Sue Bolman told me one morning over breakfast. For more than 30 years Sue has spent summers in her cottage on Horn Hill. Summer residents do just fine with locals. “The fishermen were always invited over for cocktails, and they accepted with gusto,” she said.

The warmth is reciprocated. She spoke of

Alfred Stanley and how last year, when she was hospitalized inshore with a heart ailment, he visited three times a day. “He didn’t feel compelled to chatter, tell jokes, or mutter platitudes. He just sat by the bed and held my hand,” and you could tell how deeply moved she was by his compassion.

There is something healing about islands. Perhaps it’s the limitless expanse of water, suggests Jan Bailey, a poet, who once lived on Monhegan and still summers there. “Water heals,” she says. “Its permanence sets the rest of the world in perspective. There is greater solitude and inner time here.” We sat on her porch overlooking a pond, sipping gin, and watching mallards glide on the dark green water.

The interior of her cottage is decorated with whimsical brushstrokes of lemon, blue, and lavender. When I complimented its cheerfulness, Jan explained she had painted it herself one winter. “My neighbor Alice Boynton said to me, ‘You will learn to love the gray.’ But that never happened.”

Is there a square inch of Monhegan that has not been painted? Perhaps it is the silver light that dances off the mirror of the sea or the fog that softens the landscape that has lured painters here since the 19th century. Among them are Edward Hopper, the American painter of urban desolation, the illustrator Rockwell Kent, and three generations of Wyeths: N. C., Andrew, and Jamie.

Ted Tihansky is an artist. Ted also is a mess. He has paint everywhere but on the canvas. On his forehead, a war-paint-like slash of blue; in his hair, chartreuse; on his shirt, chrome yellow. What is it about Ted that invites disaster? Once when he was painting by the shore, a little girl came over to watch, and in the wink of an eye the painting tipped over on her, and she became a living canvas.

Watching Ted paint is a spectator sport, judging from the knot of tourists gathered in the road behind him. It is a dance. He steps back from the easel, then forward, brush in hand, back and forth, and soon the glorious display of larkspurs, nasturtiums, and poppies growing in the garden belonging to Kathie Iannicelli, the island’s greenest thumb, lifts from the canvas and blooms with such exuberance as to dazzle the eyes. “Painting is my life,” says Ted, who is tall, rangy, and endearingly earnest. “It took me 30 years to learn that.” Monhegan



IN A SCENE WORTHY OF ROCKWELL KENT, *painter of bold Monhegan landscapes, morning*



fog lifts off the meadow behind the Josiah Starling house, a witness to island dawns since 1784.

has been an artistic epiphany for Ted. "People here take their lives seriously," he says, returning to the canvas, painting furiously.

BY NOVEMBER, wind and cold have stripped the island. Leaves are gone, and so are tourists. The water is turned off, marking the dividing line between locals and anyone else. Only residents, who have wells and do not rely on town water, remain. "If you can't stand the winter, you don't deserve the summer," a T-shirt says. In winter the wind blows with such fury picture windows fronting the harbor bow in from the pressure. Ferry service cuts back to three boats a week, weather permitting. The rhythm of the island shifts. For fishermen the year begins with December 1, or Trap Day, when lobstering starts.

Monhegan is the brain trust of fishing. Seven of the island's 16 lobstermen have college degrees. Bryan Hitchcock went to Andover, then got a degree in business at Lehigh University. His sternman, Ray of the Carina grocery (nearly everyone holds more than one job), has a degree in architecture.

Although he once worked as a freelance photographer, for the past 30 years Hitchcock has fished for lobster. When I asked why, he explained that it was being his own boss and not having to listen to anyone else. "If you feel like going out, you go. If not, you don't."

It's also, he added, the thrill of pulling the trap and never knowing what you will see. "You may get a blue lobster" (genetic permutations produce such things). "And once I caught a half-black, half-yellow lobster." Trap Day was two weeks away, and Hitchcock sat in his fishing shack hammering out dents in his wire traps in preparation for the season.

Monhegan has a fiercely won set of lobstering regulations. Some are state law; some are local tradition. On Trap Day the rule is that everyone goes or no one goes. That's tradition. The Monhegan Lobster Conservation Area, limiting fishing to holders of a Monhegan license, is state law passed by the legislature in 1998. Then there is the law of lobstermen, a place where local tradition and state statutes blur; it has to do with territorial claims and who has the right to a license. "If you are a lobsterman, you know where you belong," says Mattie Thomson, a Monhegan lobsterman



who has fished with every kind of net, line, or trap known to man on both coasts and beyond. "On this island you can't buy your way in."

MONHEGAN IS FULL OF STORIES that take on the quality of myth: The time Billy Payne dumped his books and Princeton degree off the wharf to make a statement about who he was. The time Danny Bates nearly burned down Manana Island (he was trying to torch two derelict buildings, but things got out of hand). The time Bryan Hitchcock fell overboard in winter and came home iced over and turning blue, and his wife asked:



FISH BEACH WELCOMES *lobsterman Dan Murdock and his specially designed Monhegan skiff; his larger boat is moored in the harbor. Fishing December into June, the island's 16 lobstermen, like their boats, seem built for rough water.*

“What are you doing home?” The many times Harry and Doug Odom, who ran the general store for 43 years, sold land they owned for a fraction of its worth so fishermen could afford a place to live.

There are darker tales too—stories of Old Testament rectitude like something out of Nathaniel Hawthorne: The time the teacher of the island’s schoolhouse rubbed some parents the wrong way, was shunned and forced out,

leaving a trail of bitterness. Stories of fishermen banished for transgressions against the community or the rules of lobstering.

Then there was the flap several years ago over the “fairy houses”—Lilliputian structures of lichen, moss, and twigs erected in Cathedral Woods by visitors or local residents with children. One side argued the houses were ecologically irresponsible, destructive of plants; others pointed to the magic of fantasy and



AT DAY'S END *lobstermen head for Sherman D. Stanley's fish house, used as a workshop and watering*



hole by five generations. "If someone doesn't show," says one regular, "we all start looking."

the delight of children. Tempers flared; fairy houses were stomped to bits. When a reporter for National Public Radio asked Faryl Henderson, an islander who is pro-fairy houses, how such issues were discussed, she replied: "We don't discuss anything out here. We just form our opinions, and then we silently brood."

Islands are like that, says Charlie MacDonald, who first came in 1946 and keeps track of Monhegan's weather as his way of giving something back to the place that offered his spirit safe harbor after the pain and trauma of World War II. I'm in his living room, listening to him discuss the protocol of island life. You don't want to rock the boat, he advises. "Everybody on the island needs help sometime." You may need a cup of sugar, a tank of fuel, a tow on the water. Confrontation can be tricky. Best to be on good terms. *Blessed are the Flexible; for they shall never be bent out of shape*, a sign on the refrigerator says. "Now if anybody takes exception to anything I tell you, I stand to be corrected," Charlie says when I leave.

Yet, in crisis, there is caring, compassion, loyalty. The islanders draw together and become caretakers for their own.

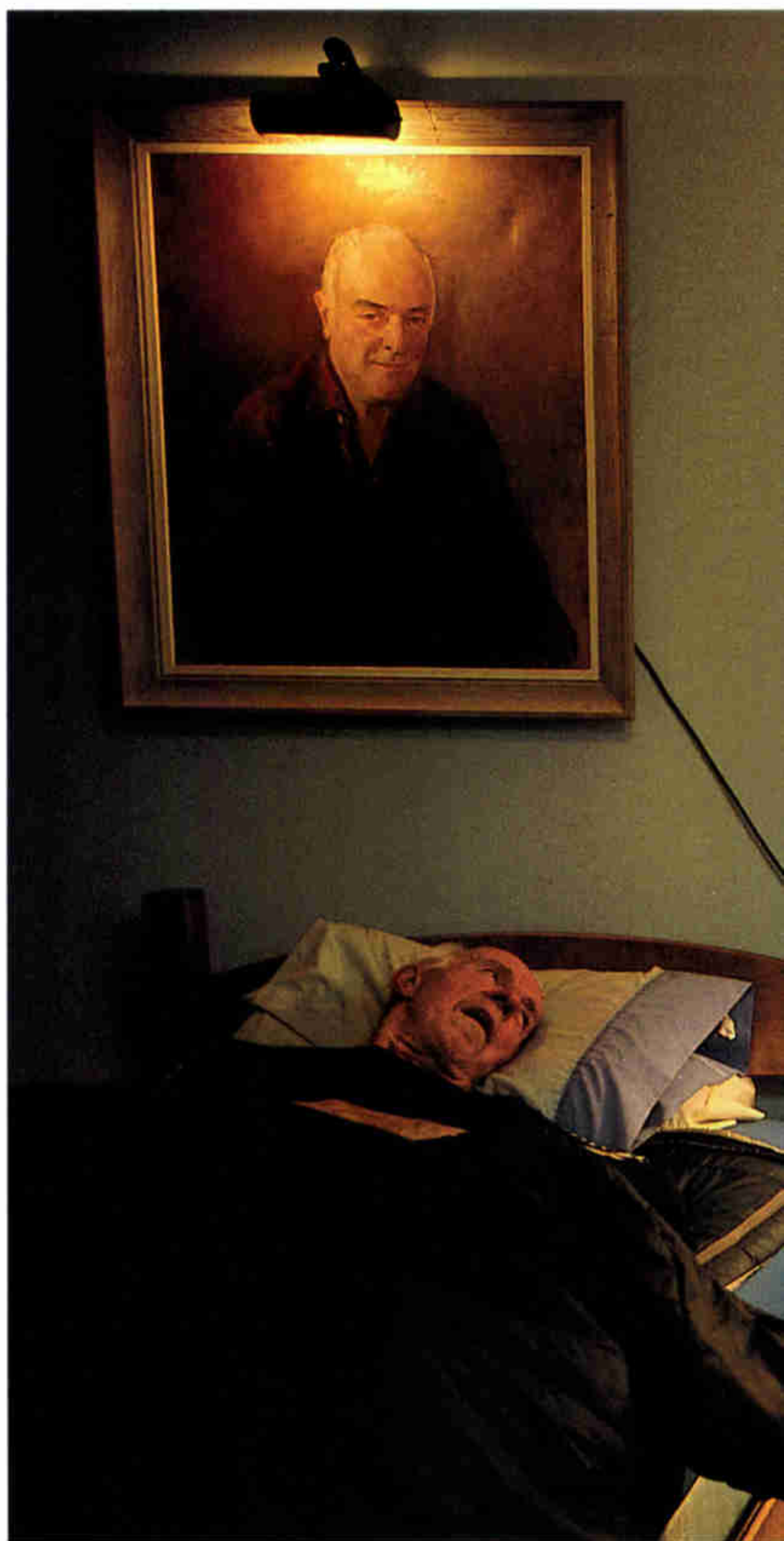
Lynne Drexler became one of the island's own. She came to paint and stayed. Her voice was like dark molasses with the elongated vowels of Tidewater Virginia, where she grew up. She'd hold court on her couch in her white sneakers. She'd have a crystal glass full of Jack Daniel's in one hand, a cigarette in the other. She had a round face and eyes that sparkled with the certainty that human folly ruled and wasn't that a hoot. Her tongue could sting. She could be bossy. In a letter she wrote about a friend who died, she said, "I feel badly that I couldn't have reached out more, given more affection, but then that isn't me."

She put her love into painting instead. She'd lean a canvas against a wall, sit on the floor and paint her heart out. She did that every day, except Saturdays, which she reserved for the Metropolitan Opera radio broadcast.

She painted in bold sweeps of color. She had that vision artists have whereby seas can be pink, trees can be blue, and the grays of the world aren't grays at all but

MORE ON OUR WEBSITE

Find tips for a summer visit to Monhegan and watch an interview with photographer Amy Toensing—a former Geographic intern—at nationalgeographic.com/ngm/0107.



reds and oranges so hot they singe the senses.

A diagnosis of cancer and emphysema put her on notice she had six months to live. Definitely, she lasted another year. In the end a circle of friends honoring her request to die on the island enabled her to do so. "I can see her now, sitting across the table," Harry Bone told me. "You'd drop by, thinking you had a real scoop, but she already knew the details." Harry, a seaman who worked oil tankers and tugboats, has lived on the island for the past 15 years. He takes care of three dozen or so summer cottages, and so it happened that he and seven others formed a hospice group to take care of



INSEPARABLE BROTHERS Harry and Doug Odom turn in beneath each other's portraits while Taxi keeps watch. "It's a good life," says Harry. Lobstermen, merchants, and island benefactors for some 60 years, the Odoms recently moved inshore.

Lynne. For the last months of her life, they took turns staying day and night. Talking when need be; silent when need be.

She died on the morning of December 31, 1999. Tralice, Kathie, Pam, Barbara, Jackie, Alice, and Luke, the paramedic, were there; so was Harry. Tralice held one hand, Harry another, and Alice went to get her recording of *Don Giovanni*, Mozart's sublime opera about a man incapable of fidelity, who causes

the one woman he professes to love great pain.

"I don't know if Lynne could hear at that point, but it sure helped us," Harry told me. You might say that Lynne Drexler turned her dying into a party to which everyone she cared for was invited. There are worse ways to leave this world.

"After she died," Harry told me, "I leaned over and kissed her on the forehead."

He paused. "She would have hated that." □



An Ethiopian priest holds a copy of The Miracles of Mary inscribed in Geez—the ancient language of Aksum. Today this fallen kingdom survives through the faith it embraced nearly 1,700 years ago.

KEEPERS OF THE LIVING LEGACY OF AKSUM



THE FAITH

BY CANDICE S. MILLARD
NATIONAL GEOGRAPHIC EDITORIAL STAFF

PHOTOGRAPHS BY GEORGE STEINMETZ



Pilgrimage site for Ethiopian Christians, Lalibela is revered for its 12 stone churches, cut from volcanic tuff some 800 years ago. Bieta Giyorgis, still a place of worship, is reached by descending the stairs at top right and following a serpentine tunnel to the courtyard 40 feet below.

“THIS IS THE PRIDE OF ETHIOPIA. IT IS THE HERITAGE



OF THE WHOLE WORLD.” —KESE-GEBEZ WEDAJENEW ASSEFA, PRIEST

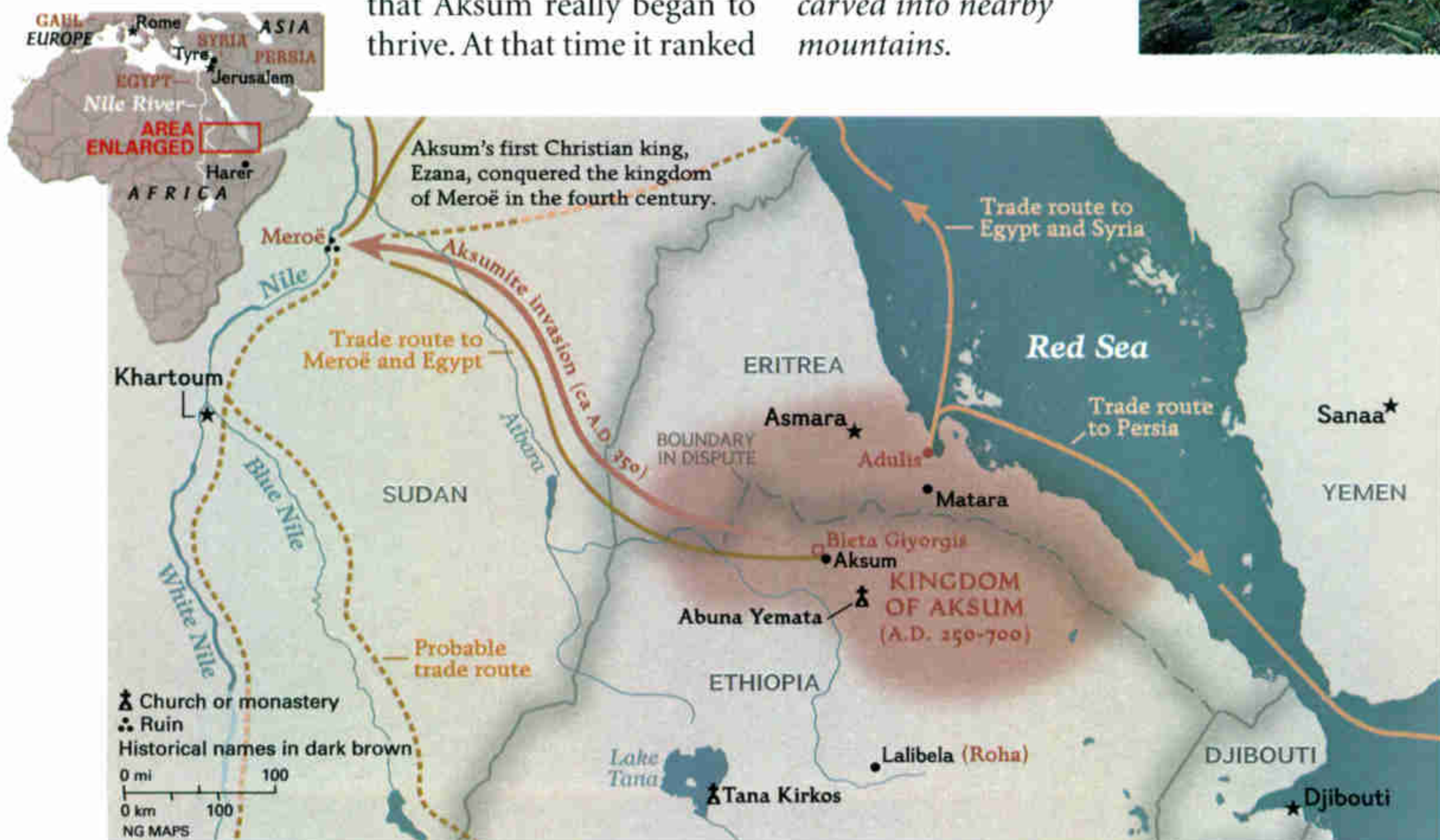
LIKE THE EMBLEM of a fallen monarch, the proof of Aksum's majestic lineage lies carved in shattered stone. In this poor and isolated town in Ethiopia's northern highlands, one of ancient Africa's greatest architectural triumphs was created—a 100-foot, 500-ton stela, the world's largest single-stone obelisk. Some 1,700 years ago it was cracked from a syenite quarry, hauled nearly three miles by the strength of elephants or men, and carved to look like a 13-story building. It probably fell as it was being raised, smashing the tomb it was meant to mark. It remains where it landed, surrounded by more than a hundred other stelae. Some still stand, others lie toppled and broken. All are reminders of Aksum's former glory, testimony to its past as one of the world's great kingdoms.

Aksum today is a dusty agricultural town surrounded by a patchwork of farms clinging to terraced mountains, cut off from the Red Sea by Eritrea, which won its independence from Ethiopia in 1993. But it was once the heart of a powerful kingdom that ruled parts of modern-day Ethiopia, Eritrea, and, for a time, Yemen, and grew fat on the narrow sea's wide-reaching trade.

Aksumites claim that the biblical Queen of Sheba reigned here in the tenth century B.C., but it wasn't until the third century A.D. that Aksum really began to thrive. At that time it ranked

A KINGDOM BY THE SEA

For more than 400 years Aksum thrived on the Red Sea, growing rich on trade with Rome, southern Arabia, and even Gaul—modern-day France. When Islam rose in the seventh century, the Christian kingdom began to fall. But in its spirit rose a new city 150 miles to the south, Roha, later renamed for the emperor who built its first churches: Lalibela. After his death more churches, like Genneta Maryam (right), were carved into nearby mountains.





with the empires of Persia, China, and Rome. In the fourth century Aksum's king, Ezana, converted to Christianity and transformed his kingdom into one of the world's first Christian states. It was during Ezana's reign, legend says, that the fabled Ark of the Covenant—the gilded wooden chest that held the stone tablets on which God gave Moses the Ten Commandments—was brought to Aksum. And it is here, some believe, that the Ark still resides, a symbol of enduring faith.

Ezana ruled over a prosperous kingdom and built a military force that conquered neighboring Meroë. But as Islam rose in the seventh century, Christian Aksum began to crumble. In the end it lost its hold on the Red Sea and, as a result, contact with the rest of the world. "Encompassed on all sides by the enemies of their religion," Edward Gibbon wrote in

The Decline and Fall of the Roman Empire, "the Æthiopians slept near a thousand years, forgetful of the world, by whom they were forgotten."

ARCHAEOLOGISTS have not forgotten Aksum. They've been studying this ancient kingdom for nearly a century—not only as a stronghold of Christianity but as a living time capsule. Kathryn Bard and Rodolfo Fattovich were the first archaeologists to return after the 17-year civil war that ousted Ethiopia's communist regime. Since 1993 they have spent most summers at Bieta Giyorgis, Aksum's earliest site.

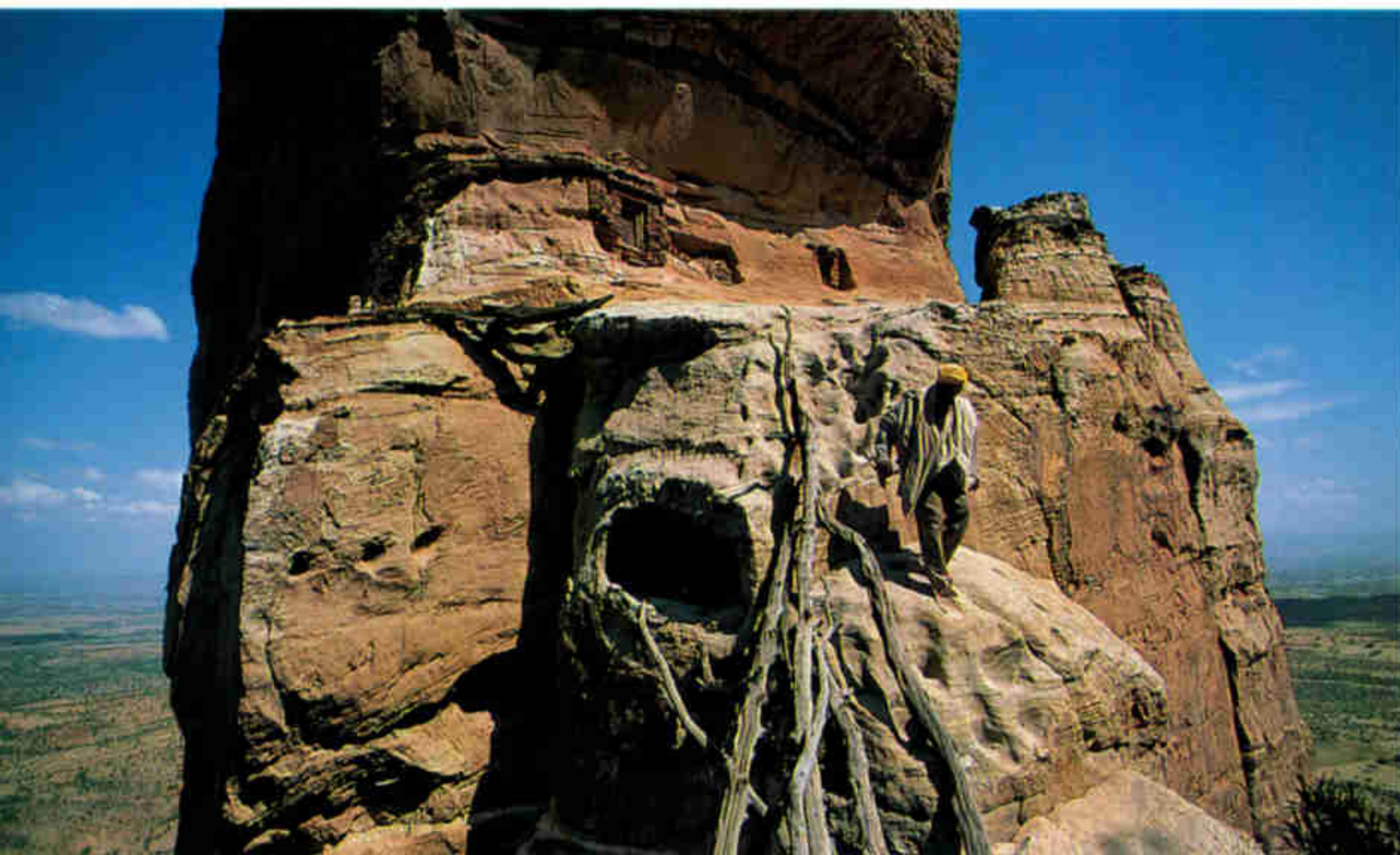
Fourteen degrees from the Equator and 8,700 feet high, the site—still home to a handful of farmers—is not easy to reach, but the two archaeologists are not complaining. "I'm glad it's hard to get to," said Bard. "That's why

we were the first to work here and why no one's fighting us for it now."

Access is not the only difficulty Bard and Fattovich have had to face. On their first day at the site a policeman wearing a belt of hand grenades warned them not to stray far from the marked path—the only clear swath up a mountain studded with land mines. Five years later, in 1998, war once again darkened Aksum when Ethiopia clashed with Eritrea, just 30 miles away. The crack of gunfire and the roar of bombers became part of the archaeologists'

to Ethiopia and *injera*, the flat, sour bread that is a staple of the Ethiopian diet. Made from teff, a tiny, drought-resistant grain, injera is traditionally baked on a wide clay pan over a cow-dung fire. Not only have Bard and Fattovich's team found grains of teff and sherds of the same kind of clay pan in Bieta Giyorgis's tombs, but it is likely that ancient Aksumites also fed their fires with dung. "We have pretty conclusive evidence that this place was deforested even then," Bard said.

The ghosts of Aksum were everywhere. They



TEST OF FAITH

After an hours-long climb, parishioners of Abuna Yemata, a mountaintop church south of the town of Aksum, cross a tree-limb bridge and negotiate an 18-inch-wide ledge over a 650-foot drop. Inside, the weary lean on prayer sticks, encircled by 350-year-old paintings of Ethiopian saints.

daily existence. "We could hear the fighting," Fattovich recalled. "And we were terribly aware that people were dying not far from us."

Despite the dangers, Bieta Giyorgis has proved irresistible. "These people are living a life that has changed very little in thousands of years," Bard said as we hiked up the steep, rocky path. At the top we found a farmer working his field with two oxen yoked to a rough-hewn wooden pole fitted with an iron plowshare. For a few shaky minutes I took the helm. The oxen moved in a slow, ragged line under my inexperienced guidance, but the edge of the plowshare sliced easily through the soil, cleaving the land and connecting me to a distant past.

A farmer named Negisti, a single mother who struggles with a small plot of land, invited us to her home. She lives with her two young daughters in a stone hut mortared with mud and covered with a thatch roof, the same style as the homes that have sheltered Aksumites for millennia. Negisti offered us rich coffee native

appeared in a girl's braids that ran in tight rows over the crown of her head and ended in an explosion of curls, echoing the hairstyles on ceramic Aksumite heads. They were in the clay water jug an old woman carried behind her back, tied with a leather rope slung low around her shoulders. She walked with her hands behind her, palms up, balancing a container nearly identical to Aksumite jugs probably used for the same purpose hundreds of years ago.

IN LEGEND the story of Aksum begins 3,000 years ago, when the Queen of Sheba is said to have ruled the land. According to the Old Testament the queen, known to Ethiopians as Makeda, traveled to Jerusalem to visit King Solomon. The Ethiopian chronicle *Kebra Nagast* says that when she returned home, she was pregnant with Solomon's son, a child she named Menelik.

Menelik is known as the originator of the Solomonic dynasty, a nearly uninterrupted line





THE COOL STONE FLOORS WERE SLICK FROM THE



World's largest monolithic church, Bieta Medhane Alem in Lalibela sits in a 35-foot-deep trench. Locals attend services here every day, and hermits, who survive on donations from tourists and villagers, live in niches cut from the surrounding walls.

FRICTION OF CENTURIES OF BAREFOOT WORSHIPERS.



IN ETHIOPIA THE ARK OF THE COVENANT IS REVERED

of emperors said to have ended only 27 years ago with the fall of Haile Selassie. Perhaps more important, Menelik is believed to have brought the Ark of the Covenant to Ethiopia.

One legend says that the Ark came first to an isolated monastery called Tana Kirkos. The monastery, now home to some 40 Christian monks, stands at the tip of a long, stony peninsula on the eastern shore of Lake Tana, Ethiopia's largest lake, which gives its waters to the Blue Nile. A two-and-a-half-hour boat ride brought me with my guide, Worku Sharew, to the site. We scrambled up a steep path cut into the peninsula's cliff face and were met by a barefoot monk wearing a purple hat and

carrying a long wooden prayer stick. With a toothless smile he led us to a low stone bench to await the arrival of Abba Baye, the keeper of Tana Kirkos's traditions.

Wrapped in a brown robe of coarse cotton, Abba Baye walked slowly, leaning on his prayer stick and clutching a large brass cross. He blessed us with the cross, inviting us to press our foreheads against its cool metal, then sat beside us to tell Tana Kirkos's version of the story of Menelik and the Ark of the Covenant.

When Menelik grew to be a man, he went to Jerusalem to meet his father, King Solomon. He stayed for three years, and when he left, Solomon ordered the firstborn sons of his



Under umbrellas that symbolize the heavens, priests parade by Aksum's central church and the chapel they believe holds the biblical Ark of the Covenant. "The Ark is central to our faith," said one priest. "It is testimony to our religion."

AS MORE THAN A HOLY RELIC; IT IS GOD INCARNATE.

noblemen to accompany him and sent the Ark of the Covenant to protect them. For safe-keeping, Menelik brought the Ark to Tana Kirkos, where it stayed until King Ezana sent for it. The Ark is said to be hidden now in a small chapel in Aksum. It is guarded by one man—a monk named Abba Mekonen.

Known as the Atang, the Keeper of the Ark, Abba Mekonen is bone thin, with soft, watery eyes and a shy smile. I asked him if he was happy to be the Atang, which is a great honor and the most solemn post in the Ethiopian Orthodox Church.

"No," he said. "This is not a job of easy happiness. It is a heavy burden." Abba Mekonen,

age 69, has shouldered this burden for three years and will continue to until his death. He never leaves the chapel compound, and he is the only person allowed to see the Ark.

Abba Mekonen gently refused to explain this centuries-old tradition. But at Tana Kirkos when I had asked Abba Baye why I could not see the Ark, he had shrugged and said simply: "Who can look on the face of God?"

ALTHOUGH ETHIOPIA'S CLAIM to the Ark is anchored only in legend and faith, the ancient origins of its Christianity are, literally, set in stone. When King Ezana converted to Christianity in the fourth



century, he covered stone monuments with inscriptions in Geez (Ethiopia's first written language), South Arabian, and Greek, praising God for his military victories. Aksum's conversion is also set in gold, on coins that Ezana inscribed with crosses, and in ink, by a fourth-century writer named Rufinus.

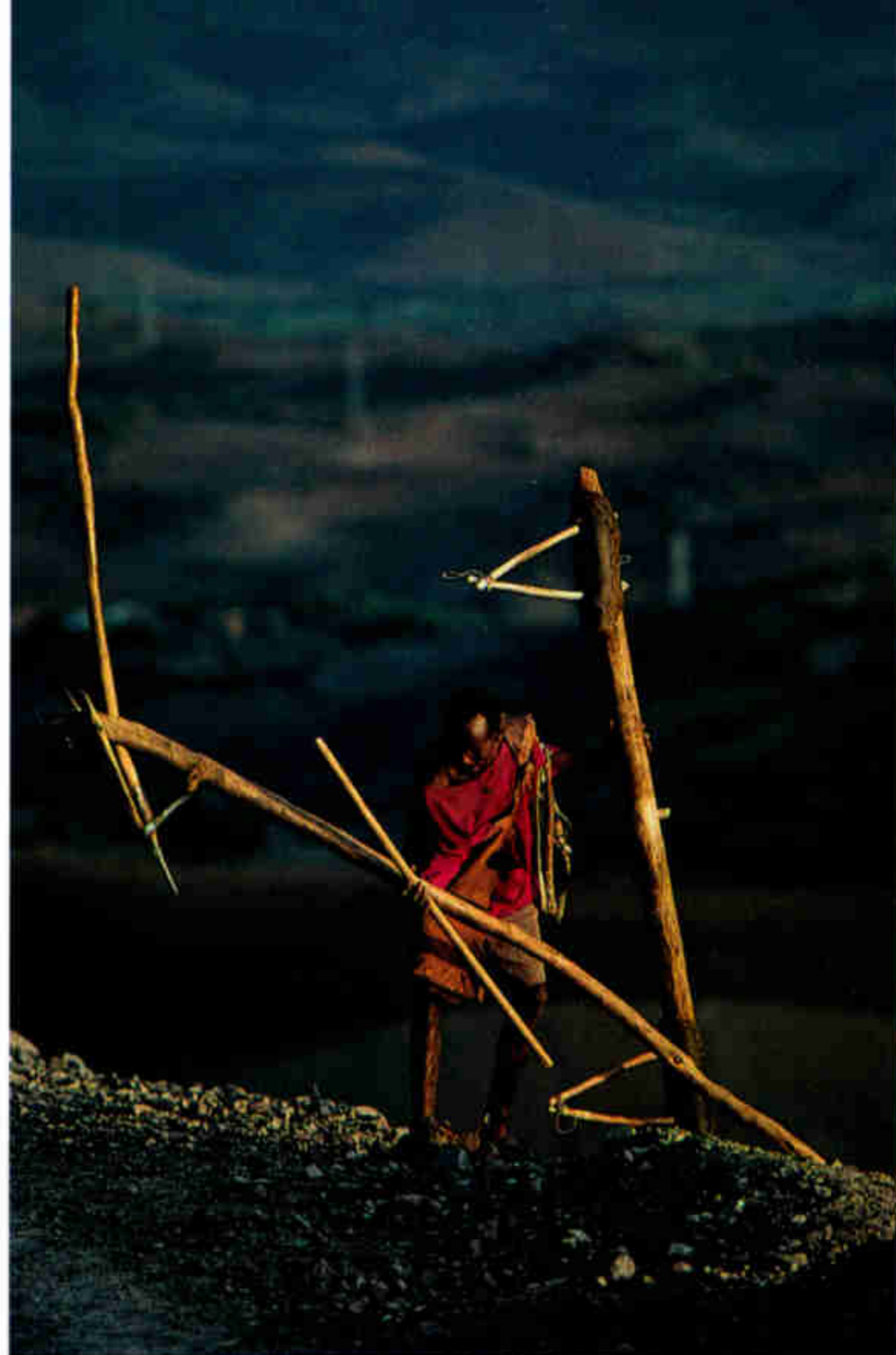
Rufinus's chronicle tells the story of Frumentius, a young Christian from Tyre who encouraged Aksum's few Christians and likely converted Ezana himself. Frumentius became Ethiopia's first bishop, and Ezana adopted Christianity as Aksum's official religion.

It took 200 years for Christianity to take root in Aksum, but today more than half of all Ethiopians are Christian, some 30 million people. Their faith, because it survived in isolation here for a thousand years, is a unique blend of Old and New Testament teachings. Great devotion is shown to the Virgin Mary, for example, yet to this day Ethiopian Orthodox customs echo Judaic law, calling on members

of the church to circumcise their male children on the eighth day, rest on the Sabbath, and abstain from pork. But many Ethiopian Christians also embrace beliefs found nowhere in the Bible.

Worku Sharew bears the mark of this distinctive faith on his face, in a small, dark line to the right of his right eye. He was given this tattoo—which I saw throughout northern Ethiopia, sometimes as a cross or a double line—when he was a baby. Like the haircuts many Ethiopian parents give their children—a shaved head with a small tuft of hair just above the forehead—these tattoos are meant to protect the wearer from evil.

Since perhaps the 16th century some Ethiopian Orthodox Christians have also believed in benign spirits known as *zars*. Worku's mother had claimed to have one, a strong-willed spirit that proudly proclaimed its Christianity and took over in times of emergency. "I was a sickly child, and my first memory is of my mother



LIVING HISTORY

Ethiopian monks preserve ancient beliefs and early treasures, like this 15th-century liturgical fan (left). Farmers also keep the past alive, using a traditional style of plow to grow teff, a grain that has fed the people of the region for millennia.

hovering over me, healing me,” he said. “They say I died and she brought me back to life.” When typhoid struck Worku’s village, his mother’s zar went to work: “She would touch her forehead to the sick person’s forehead three times,” Worku said, “and the sickness would transfer to her but not affect her.”

IN THE CENTURIES since its introduction, Christianity in Ethiopia has survived many threats. The most recent took the form of the Communist regime during the 1970s and '80s, when political attempts to eliminate all religious practices in Ethiopia backfired, giving rise to a tremendous resurgence of Christianity. In the 16th century the Muslim Ahmad Gragn had more success. From the walled city of Harer in eastern Ethiopia, Gragn invaded the highlands, burning churches and forcing Christians to convert to Islam.

But the historical figure Ethiopians most love to hate is Queen Gudit. The story is told

that Gudit was born into a royal family in the tenth century, got into trouble, and left Aksum in disgrace. When she returned, she was armed with a lust for revenge and the military might of a king from the south.

By the time Gudit supposedly attacked Aksum, the kingdom had been in decline for centuries, but Gudit is credited with delivering the fatal blow. Storming through Aksum, she destroyed churches, forced the king to hide the Ark of the Covenant back at Tana Kirkos, and, finally, invaded the capital, killed the king, and ascended the throne.

Archaeologists have had difficulty finding hard evidence that Gudit existed, but Aksum probably did suffer a military defeat in the late ninth or early tenth century, when it was at its weakest—stricken by drought, famine, and a devastating plague. Broken and impoverished, the kingdom took its place in the past, and the young state that rose from its ashes moved its capital south, to an isolated town named Roha,



later renamed in honor of its most celebrated emperor: Lalibela.

“Aksum is the holiest city because it is the first, the oldest, and because of what it has, the Ark,” Worku Sharew told me. “Lalibela is holy because of its promise: Coming here is as good as going to Jerusalem.”

The promise of Lalibela is not readily apparent. The land is barren and denuded, its River Jordan is just a shallow ditch that often holds only a trickle of water, and the town is deeply poor. But the promise

that Worku spoke of lies not in Lalibela’s land but in its 12 remarkable rock-hewn churches.

Called prayers in stone, these churches—carved from cliff faces and scooped out of the living rock to stand in deep stone trenches—were molded from the region’s red mountains some 800 years ago. Legend says that they were built by angels, who helped Lalibela at night while he and his legion of workers labored by day.

Lalibela stands on soft volcanic tuff, easily cut without divine intervention, but it’s not hard to imagine angels hovering over these masterpieces, coaxing them from shapeless stone. The most stunning is Bieta Giyorgis,

MORE ON OUR WEBSITE

More about Aksum’s architecture and heritage can be found at nationalgeographic.com/ngm/0107.



STILL STANDING

Nearly 70 feet tall, this geometrically carved obelisk has marked a royal tomb in Aksum for 1,700 years. The only hint of vulnerability: a slight tilt. Aksumites stopped erecting stelae when they abandoned their pagan gods and converted to Christianity, but these colossal stone slabs still recall the power of Aksum, a kingdom that shaped a country.

a massive monolith intricately carved and shaped like a cross, all 40 feet of it below ground level. “This is the pride of Ethiopia,” said Kese-Gebez Wedajenew Assefa, Bieta Giyorgis’s priestly guardian. “It is the heritage of the whole world.”

As I wandered through the pink-hued passageways that wind from one church to the next, ancient Geez, still the liturgical language, echoed around me. The heavy scent of frankincense, one of Aksum’s earliest exports, billowed through cross-shaped windows in gusts so thick that the churches seemed to be burning. Inside, the cool stone floors were slick from the friction of centuries of barefoot worshipers.

Before slipping off my shoes to enter Bieta Medhane Alem, the world’s largest monolithic church, I stopped to talk to a hermit hunched over a small prayer book. He said he had lived in Lalibela most of his life and that he planned to stay until his “body and soul separate.”

His words echoed Worku’s: “I stay here because Lalibela has a promise, a covenant. He who comes here to live, he who comes here to pray, he who comes here to die will be saved.” This faith, as indelible as it is ancient, has sustained Ethiopian Christians through centuries of isolation and famine, foreign occupation and civil war. It is the promise of Lalibela, and the legacy of Aksum. □

70085

“Nobody gonna



get rich, but everybody in the same boat.”



BY JOEL BOURNE, JR.
NATIONAL GEOGRAPHIC EDITORIAL STAFF

PHOTOGRAPHS BY MEDFORD TAYLOR

Fish-house workers Carrie Deffes, left, and Joy Cousté grab a quick bite at Yscloskey Seafood during the frenetic mullet season.



The last thing you see in Delacroix, Louisiana, is a welcome sign. First you have to drive southeast of New Orleans along Bayou Road, a cracked two-lane blacktop that skirts ruined sugar plantations, ancient cemeteries, and live oaks dripping with Spanish moss. Go through the steel gates of the massive hurricane-protection levee and try to imagine the flood that would close them. After you pass a hundred shrimp boats tied to rickety docks and roughly the same number of houses on stilts, the asphalt plays out at a faded billboard teetering on the edge of the bayou. It reads, “Welcome to the End of the World.”

The residents aren’t apocalyptic—the sign advertises a long-closed bar—but they are keenly aware of their place in the universe. Life for nearly all 300 people who live on this island is dictated by the seasons: the white shrimp season, the brown shrimp season, the mullet season, and, of course, the hurricane season.

“When the hurricanes come, everybody fills sandbags and puts them along the road,” says Curtis Morales, whose Island Seafood company sits within shotgun range of the sign. “If one person drowns, they all drown.”

Such community spirit isn’t that surprising in a place where everyone seems to be related. The island has earned a bare-knuckled reputation for defending itself from outsiders and the elements. Roughly four miles long and 300 feet wide, Delacroix lies between the coffee-colored water of Bayou Terre aux Boeufs and seemingly endless marsh. It’s as much a state of mind as a physical reality—the spiritual homeland for thousands of descendants of Canary Islanders and other Spaniards sent here between 1778 and 1783 to reinforce Spanish claims. These “Isleños” survived by hunting, trapping, fishing, and hunkering down during the big blows. In 1915 and 1965 hurricanes all but razed the island. Countless more have sent islanders fleeing to higher ground. Always they return.

70085

AMOUNT OF FISH BAIT SOLD IN ONE YEAR IN ST. BERNARD PARISH (COUNTY):

About 146,000 pounds

LEAST PALATABLE HOME

REMEDY: Slug of whiskey with a roach in it, taken in lieu of a tetanus shot

MOST POPULAR ORDER AT THE JUNCTION FOOD

STORE: Ham-and-cheese po’boy

FIFTEEN MINUTES OF

FAME: Mentioned in Bob Dylan’s song “Tangled Up in Blue”

MOST POPULAR

NICKNAME:

Doody (4)

Though only 20 miles from New Orleans, Delacroix and nearby bayou communities are a world apart.





TOWN & COUNTRY

Its built-in child seat* and seat belt technology** add new life to the security blanket. Rest easy. Drive one and see why it's the best minivan ever.† 1.800.CHRYSLER or visit www.chrysler.com.

CHRYSLER



*Optional. **Always use seat belts. Remember, a backseat is the safest place for children 12 and under. †Based on AMCI overall weighted evaluations of 2001 Town & Country versus similarly equipped 2000 Model Year minivans. Call 1-877-PROVE-IT for details.



“Say you were caught peeking in a window and you were trying to hide it, you’d hear about it Saturday night.”

“It’s your culture, your livelihood,” says Morales as he weighs crate after crate of writhing blue crabs. “So you just stay.”

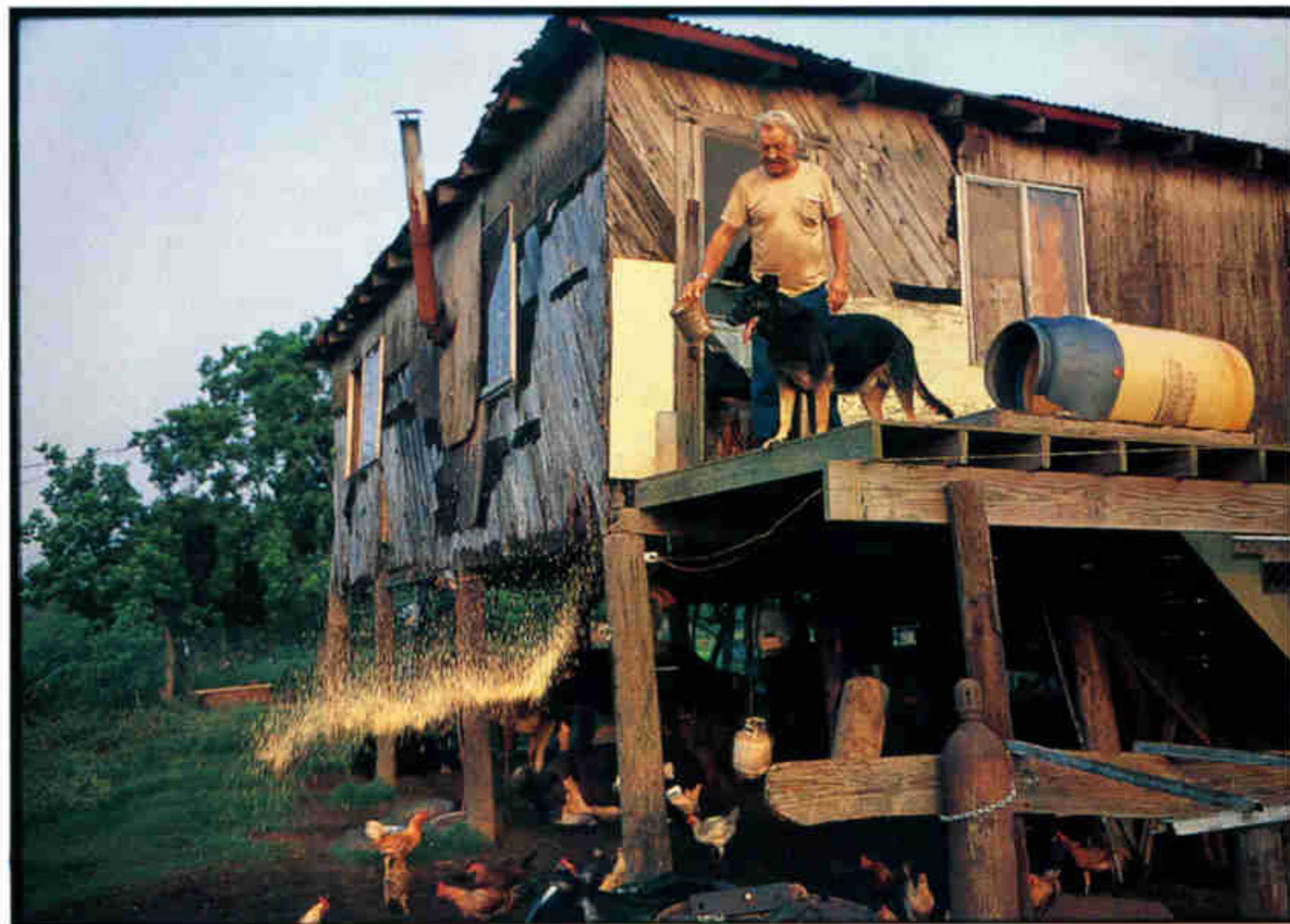
The culture is changing. Few people under 50 speak Spanish anymore, the dominant language on the island through the 1940s. Nor do they sing the old songs—Spanish ballads known as *décimas*, which date back more than 500 years.

Irvan “Pookoo” Perez, 77, is trying to rectify that by performing the songs at local gatherings. Over plates brimming with shrimp jambalaya and crabmeat casserole, he explains that *décimas* could be sad or raunchy, but usually dished out stinging social commentary that kept fellow Isleños in line. “If anything happened in the community, say you were caught peeking in a window and you were trying to hide it, you’d hear about it Saturday night,” says Perez with a mischievous grin. “We had about five dance halls. People would come from all over to hear the *décimas*.”

Perez clears his throat, closes his eyes, and sings a tune he learned from his father. It’s about a girl who wanders the islands with “no mother, no father, no friends to console me. I go and come as the waves of the sea. . . .” Perez is a barrel of a man who made his living trapping muskrats and working at the Kaiser Aluminum smelter in nearby Chalmette. But he sings in high, fluttery Spanish, his thick hands keeping time on the white lace tablecloth as the mournful words pour forth.

The dance halls are gone. So are the movie theater, the

Scratching a living from land and sea, an oyster boat returns to port and farmer Fred Johnson (below) feeds his flock.



Mother Nature's Step Aerobics ▶



▶ Mother Nature's Energy Bar



*The crunchy 100% natural energy source
made from whole grain oats.*

The Energy Bar Nature Intended.®


The Nature Conservancy

Save the Last Great Places
© GMI 2000 Nature Valley is proud to have donated \$360,000 to The Nature Conservancy since 1998

skating rink, and the small grocery stores. A two-story pink cinder-block schoolhouse still stands, though it's been boarded shut since Hurricane Betsy hit in 1965. Children are now bused to school off the island. Fancy fishing camps and boat sheds owned by New Orleans businessmen are slowly replacing the fishermen's homes and docks.

"Used to be we never had boat sheds," says Dennis Menesses, captain of the shrimper *No Mas*, named by his wife, who said it would be his last. Menesses has lived on the island all his 51 years. "Now maybe 40 percent of the people are sports. All the younger people are moving up the road 'cause they can't afford to live here." Many go elsewhere within St. Bernard Parish, to Toca, Poydras, or other small communities strung out along Bayou Road in zip code 70085.

Tensions between recreational and commercial fishermen flared in 1995, when a sportsman's group then called the Gulf Coast Conservation Association (GCCA) pushed for a statewide ban on gill nets. The group argued that the nets were decimating populations of redfish, flounder, and speckled trout, three of the state's most popular game fish. Delacroix fishermen, who earned much of their livelihood with the nets, claimed the sports wanted all the fish for themselves. They blocked the road to Delacroix for a few days in protest, but state officials banned most uses of the nets nonetheless. You can still see signs that read "No GCCA" and "No Nets, No Seafood." The paint has faded but the sentiment lingers, although the fishing, by all accounts, is the best it's been in years.

"I had a guy come down from Baltimore once, said 'My grandson ain't gonna see no redfish,'" says Eddie Montelongo, 64, a retired commercial fisherman turned fishing guide. "I say, 'So what? I gotta make a living. I never seen no dinosaur either, and it don't bother me.'"

Montelongo offers to show me what all the fuss was about. We step into his 25-foot skiff and are soon careening through a maze of channels that weave through the marsh. At Lake Cuatro Caballo he cuts the engine, shows me how to thread a kicking shrimp onto a hook, and we cast our lines into the brackish water. In no time our red-and-white bobbers dip, then dive under, and we lock into fish: sleek speckled trout and muscular redfish that seem plated in bronze by the late summer sun.

"Ain't a bad life, you know?" Montelongo says, after we catch our limit and head in. "You do what you want to make a living. Nobody gonna get rich, but everybody in the same boat. That's Delacroix."

It sounded like a *décima* in the making. □



Mass is celebrated daily at St. Bernard Catholic Church—a pillar of Isleño life since 1785.

MORE INFORMATION

ON OUR WEBSITE There's more on 70085 at nationalgeographic.com/ngm/0107. Tell us why we should cover **YOUR FAVORITE ZIP CODE** at nationalgeographic.com/ngm/zipcode/0107 or mail your suggestion to PO Box 96095, Washington, DC 20090-6095. E-mail: zip@nationalgeographic.com

For people with type 2 diabetes

**“I will always
take care of my diabetes.”**



“I have a lot of great reasons to take care of myself. But the most important one is named Maria.

“She’s one of the reasons I’m eating right and exercising more. When that wasn’t enough, my doctor added *Avandia* to help me manage my type 2 diabetes. *Avandia* works differently than some diabetes medications. It helps my body use its own natural insulin more effectively.

“Since I started taking *Avandia* about a year ago, my blood sugar level has come down and stayed down. Your results may vary.”

**Strengthen your body’s
own ability to help control
blood sugar.**

Avandia, along with diet and exercise, helps improve blood sugar control. It may be prescribed alone, with Glucophage® (metformin HCl tablets) or with sulfonylureas. When taking *Avandia* with a sulfonylurea, you may be at risk for low blood sugar. Ask your doctor whether you need to lower your sulfonylurea dosage.


In some people, *Avandia* may cause fluid retention, or swelling. This could lead to or worsen congestive heart failure, particularly in people taking insulin, so tell your doctor if you have a history of these conditions. You should not take *Avandia* if you are in the later stages of heart failure. If you experience an unusually rapid increase in weight, swelling or shortness of breath while taking *Avandia*, talk to your doctor immediately.

Also, blood tests to check for serious liver problems should be conducted before and during *Avandia* therapy. Tell your doctor if you have liver disease, or if you experience unexplained tiredness, stomach problems, dark urine or yellowing of the skin while taking *Avandia*. See important patient information on the following page.

If you are nursing, pregnant or thinking about becoming pregnant, or if you are a premenopausal woman who is not ovulating, talk to your doctor before taking *Avandia*.

**Talk to your doctor, or for more information
call 1-800-AVANDIA (1-800-282-6342).**

 **Avandia**[®]
rosiglitazone maleate
You can be stronger than diabetes

 GlaxoSmithKline

 Bristol-Myers Squibb Company

© 2001 The GlaxoSmithKline Group of Companies
All rights reserved. AV9117NG

Please see important patient information on the following page.

www.avandia.com

Avandia is a registered trademark of SmithKline Beecham.
Glucophage is a registered trademark of LIPHA s.a.
Licensed to Bristol-Myers Squibb Company.

Patient Information about AVANDIA® (rosiglitazone maleate) 2 mg, 4 mg, and 8 mg Tablets

What is *Avandia*?

Avandia is one product in a class of prescription drugs called thiazolidinediones (thigh-a-zoe-lid-eeen-die-owns). It is used to treat type 2 diabetes by helping the body use the insulin that it is already making. *Avandia* comes as pills that can be taken either once a day or twice a day to help improve blood sugar levels.

How does *Avandia* treat type 2 diabetes?

If you have type 2 diabetes, your body probably still produces insulin but it is not able to use the insulin efficiently. Insulin is needed to allow sugar to be carried from the bloodstream into many cells of the body for energy. If insulin is not being used correctly, sugar does not enter the cells very well and builds up in the blood. If not controlled, the high blood sugar level can lead to serious medical problems, including kidney damage, blindness and amputation.

Avandia helps your body use insulin by making the cells more sensitive to insulin so that the sugar can enter the cell.

How quickly will *Avandia* begin to work?

Avandia begins to reduce blood sugar levels within 2 weeks. However, since *Avandia* works to address an important underlying cause of type 2 diabetes, insulin resistance, it may take 8 to 12 weeks to see the full effect. If you do not respond adequately to your starting dose of *Avandia*, your physician may increase your daily dose to improve your blood sugar control.

How should I take *Avandia*?

Your doctor may tell you to take *Avandia* once a day or twice a day (in the morning and evening). It can be taken with or without meals. Food does not affect how *Avandia* works. To help you remember to take *Avandia*, you may want to take it at the same time every day.

What if I miss a dose?

If your doctor has prescribed *Avandia* for use once a day:

- As soon as you remember your missed dose, take one tablet anytime during the day.
- If you forget and go a whole day without taking a dose, don't try to make it up by adding another dose on the following day. Forget about the missed dose and simply follow your normal schedule.

If your doctor has prescribed *Avandia* for use twice a day:

- As soon as you remember the missed dose, take one tablet.
- Take the next dose at the normal time on the same day.
- Don't try to make up a missed dose from the day before.
- You should never take three doses on any single day in order to make up for a missed dose the day before.

Do I need to test my blood for sugar while using *Avandia*?

Yes, you should follow your doctor's instructions about your at-home testing schedule.

Does *Avandia* cure type 2 diabetes?

Currently there is no cure for diabetes. The only way to avoid the effects of the disease is to maintain good blood sugar control by following your doctor's advice for diet, exercise, weight control, and medication. *Avandia*, alone or in combination with other antidiabetic drugs (i.e., sulfonylureas or metformin), may improve these other efforts by

helping your body make better use of the insulin it already produces.

Can I take *Avandia* with other medications?

Avandia has been taken safely by people using other medications, including other antidiabetic medications, birth control pills, warfarin (a blood thinner), Zantac® (ranitidine, an antiulcer product from GlaxoSmithKline), certain heart medications, and some cholesterol-lowering products. You should discuss with your doctor the most appropriate plan for you. If you are taking prescription or over-the-counter products for your diabetes or for conditions other than diabetes, be sure to tell your doctor. Sometimes a patient who is taking two antidiabetic medications each day can become irritable, lightheaded or excessively tired. Tell your doctor if this occurs; your blood sugar levels may be dropping too low, and the dose of your medication may need to be reduced.

What should I discuss with my doctor before taking *Avandia*?

In some people, *Avandia* may cause fluid retention or swelling. This could lead to or worsen congestive heart failure, particularly in people taking insulin. So talk to your doctor if you have a history of heart failure or swelling. You should also talk to your doctor if you have liver problems, or if you are nursing, pregnant or thinking of becoming pregnant. If you are a premenopausal woman who is not ovulating, you should know that *Avandia* therapy may result in the resumption of ovulation, which may increase your chances of becoming pregnant. Therefore, you may need to consider birth control options.

What are the possible side effects of *Avandia*?

Avandia was generally well tolerated in clinical trials. The most common side effects reported by people taking *Avandia* were upper respiratory infection and headache. As with most other diabetes medications, you may experience an increase in weight. You may also experience edema (swelling) and/or anemia. If you experience any swelling of your extremities (e.g., legs, ankles) or tiredness, notify your doctor. Talk to your doctor immediately if you experience edema, shortness of breath, an unusually rapid increase in weight, or other symptoms of heart failure.

Who should not use *Avandia*?

You should not take *Avandia* if you are in the later stages of heart failure. The following people should also not take *Avandia*: People with type 1 diabetes, people who experienced yellowing of the skin with Rezulin® (troglitazone, Parke-Davis), people who are allergic to *Avandia* or any of its components and people with diabetic ketoacidosis.

Why are laboratory tests recommended?

Your doctor may conduct blood tests to measure your blood sugar control. Blood tests to check for serious liver problems should be conducted before starting *Avandia*, every 2 months during the first year, and periodically thereafter.


It is important that you call your doctor immediately if you experience unexplained symptoms of nausea, vomiting, stomach pain, tiredness, anorexia, dark urine, or yellowing of the skin.

How should I store *Avandia*?

Avandia should be stored at room temperature in a child-proof container out of the reach of children. Store *Avandia* in its original container.



©2001 The GlaxoSmithKline Group of Companies
All rights reserved. Printed in USA. AV9116 April 2001

A tree might hug you. Every new Civic is a ULEV. Great. But what's a ULEV? It's an Ultra-Low-Emission Vehicle. One that pollutes less. Technically, it means a car emits 84% fewer hydrocarbons than current Federal Standards allow. The new Civic gets excellent fuel economy* as well. Which is really helpful. But under no circumstances should you let a tree drive. The all-new Civic.  **HONDA** Amazing but true.™



Final Edit



GRIZZLY BEARS

Best Buds

Baloo the trained brown bear, veteran of TV and film, likes to feel the California high-country wind in his face. "If he sees the pickup truck, he'll jump in, and he won't get out until we drive around the ranch," says trainer Scott Handley. Photographer Joel Sartore was struck by the pair's special bond. "We're best friends," admits Handley. "I can't take a vacation. He gets lonely. Few people understand the commitment." The trainer-bear relationship is put to the test whenever the vehicle stops. "Bears are curious; they're easily distracted," says Sartore. "When the scenery stops changing, sometimes Baloo just wants to take a walk." That may explain why Sartore stayed about 50 yards behind his subjects on this shot. His first rule of bear photography: "You don't have to be faster than the bear; you just have to be faster than your assistant."

MORE ON OUR WEBSITE

You can send this picture as an electronic greeting card at nationalgeographic.com/ngm/0107.



pressure-treated redwood:
\$715

radial saw:
\$320

15 boxes of nails:
\$40

always knowing where your kids are:
priceless

© 2001 MasterCard International Incorporated

Wouldn't it be great if you could build their college and first apartment in your backyard too? We'll get you \$10 off any purchase of \$50 or more at outdoordecor.com when you use MasterCard. Sign up with MasterCard Exclusives Online™ at mastercard.com

there are some things money can't buy.  for everything else there's MasterCard.™

ON ASSI

ON THE ROAD, IN THE FIELD,



NEHA VASANT

NATIONAL GEOGRAPHIC • JULY 2001

GOVERNMENT

C O V E R I N G T H E W O R L D



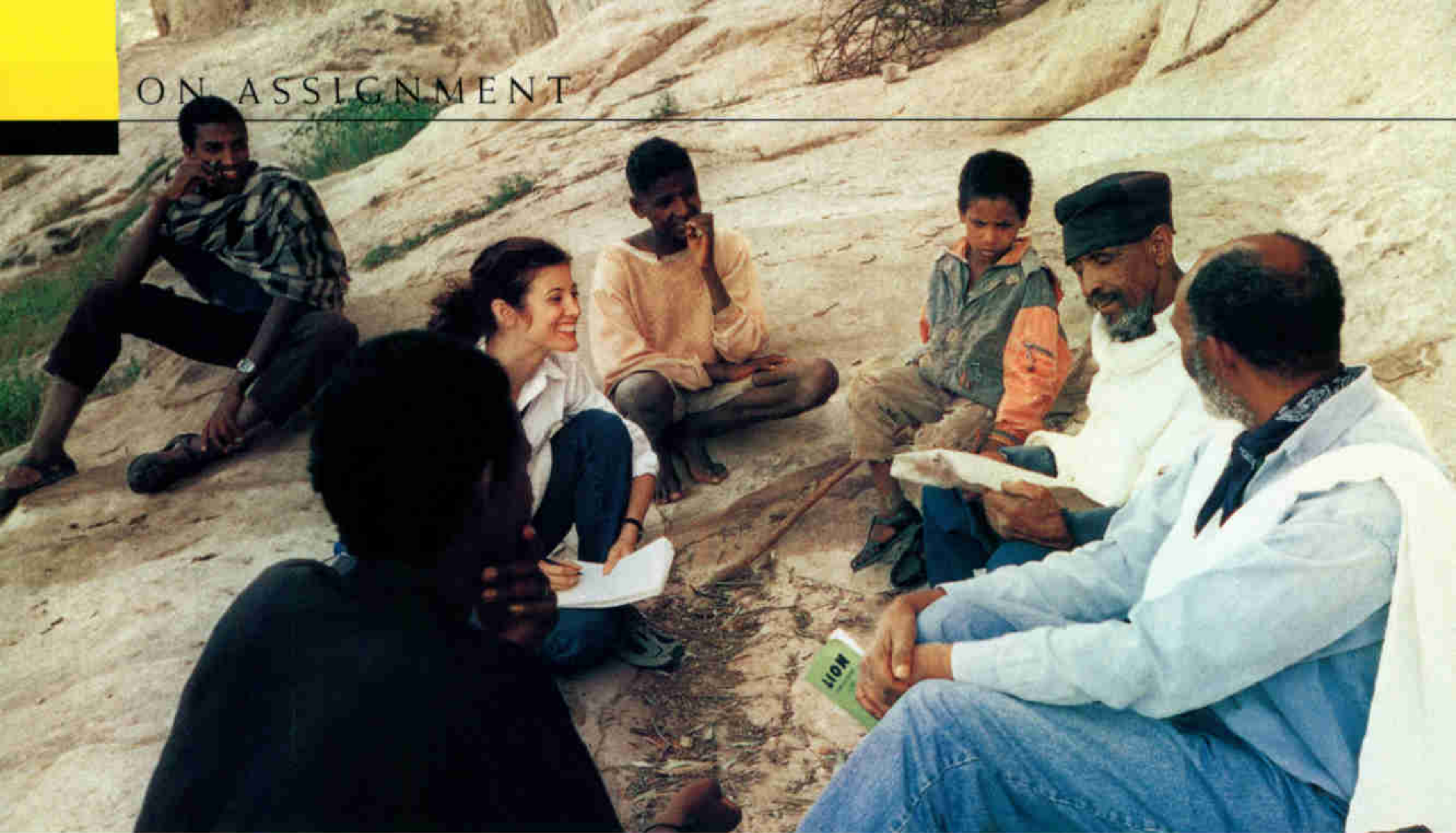
INDIA

Blessed Moment

Close encounter in the footsteps of Marco Polo

Photographer **Michael Yamashita** receives a blessing with no disguise from a 76-year-old sadhu at a temple in Mumbai (Bombay), India. The sadhu also uses the feather duster to clean his platform. "We sought him out because Marco Polo described people who renounce worldly possessions," says Mike.

When he proposed to retrace Marco's travels, Mike did not foresee that he would visit 11 countries and illustrate not one but a series of three articles. "It's the most time I've ever spent on any assignment," he says, "but it was the story of a lifetime."



KATHRYN BARD

ETHIOPIA

View From the Top

Giving author **Candice Millard** the story from on high, Abba Gebre Arejawi Negussie, second from right, details the history of his monastery, Debre Damo. "The monastery is 50 feet up a cliff,"

says Candice, an editor for the magazine. "Monks and children who go to school there climb up a leather rope. Women aren't allowed in the monastery, so this 67-year-old monk climbed down to talk with me."

In covering the legacy of ancient Aksum, Candice was moved by the people, "who have suffered so much from drought,

famine, and war yet are so kind and hospitable and pious."

Photographer **George Steinmetz** remembers a very different reception two decades ago. He had hoped to visit Ethiopia while hitchhiking in the region, but when he tried to walk across the border from Djibouti, "I was stopped by the military and told they'd shoot me if I did it again."

WORLDWIDE

After two years of photographing grizzly bears in the wild, **Joel Sartore** considered it "a leap of faith" to allow himself to be nuzzled (below) by two trained bears. During his coverage in Montana he surprised a mother with two cubs. "She got to within about 15 feet of me in a bluff charge," Joel recalls. "I looked

down at the ground, apologized, and backed up slowly."

Tom Allen, who has worked in the former Soviet Union and China, found researching Havana's treasure fleets a refreshing change. "I had no keepers, no feeling of a guy breathing down your neck," Tom says. "I was struck by the friendliness and the high level of intellectual curiosity. There was no talk at all about America's problems with Cuba."

A seafood aficionado, **Medford Taylor** ate well as he photographed Delacroix, Louisiana. His favorite meal: crawfish étouffée at Mutt's Seafood Restaurant. "Any time you lay a plate of that in front of me, it's a goner," he says.

Medford felt right at home in the region. "I love fishermen, farmers, salt-of-the-earth people who earn their keep from the land."

Visiting Cincinnati environs he hadn't seen in 30 years, Senior Editor **John Mitchell** was stunned by the sprawl. "It used to be woods and farmland," he says, while confessing he might have known what was coming. His father, a real estate agent, helped turn some of those woods into postwar subdivisions.

MORE ON OUR WEBSITE

Find more stories about life on assignment from our authors and photographers, including their best, worst, and quirkiest experiences, at nationalgeographic.com/ngm/0107.



OTTO TY KENDALL AND SCOTT HANDLEY



GET **AWAY** FROM IT ALL.

TAKE IT **ALL** WITH YOU.



VACATIONS. FAMILY TRIPS. CAMPOUTS. IT'S BEEN THE ULTIMATE ESCAPE VEHICLE FOR OVER 65 YEARS. AND NOW WE'RE UNVEILING THE BEST SUBURBAN[®] YET, THE NEW SUBURBAN Z71. WITH THE SPECIALLY DESIGNED Z71 OFF-ROAD SUSPENSION, 17-INCH WHEELS AND TIRES, AND A LUGGAGE CARRIER WITH ROLLER, IT'S EASY TO LEAVE THE WORLD BEHIND. OR TAKE A LITTLE MORE OF IT WITH YOU. CHEVY[™] TRUCKS. THE MOST DEPENDABLE, LONGEST-LASTING TRUCKS ON THE ROAD:

SUBURBAN Z71



LIKE A ROCK

*DEPENDABILITY BASED ON LONGEVITY: 1981-1999 FULL-LINE LIGHT-DUTY TRUCK COMPANY REGISTRATIONS. EXCLUDES OTHER GM DIVISIONS. ©2001 GM CORP. BUCKLE UP, AMERICA! 1-800-950-2438 OR CHEVY.COM

Flashback



UNION PACIFIC HISTORICAL COLLECTION

URBAN SPRAWL

Lane Change

“To the casual visitor, this sprawling metropolis seems almost incredible. Its huge size and fast pace leave him open-mouthed,” wrote George W. Long about Los Angeles. His article “New Rush to Golden California” was published in June 1954. This photograph of the Hollywood Freeway—perhaps meant to illustrate what passed for traffic-clogged highways of the time—was obtained by the GEOGRAPHIC that same year.

“A vast system of express highways, or freeways, laces this great urban mass together,” Long wrote. “Traffic roars endlessly on these arteries at 55 miles an hour or more. . . . This is a city on wheels.”

This photograph has never before been published in the magazine.

MORE ON OUR WEBSITE

You can send this month's Flashback as an electronic greeting card and access the Flashback photo archives at nationalgeographic.com/ngm/flashback/0107.

YESTERDAY:

How many kids?

TODAY:

How many scoops?

TOMORROW:

How many college degrees?

The easy answers aren't always right in front of you. Especially when it comes to investing.

But with *State Farm Mutual Funds*[™], you have the help of a Registered State Farm Agent. And you can get started for as little as \$50 a month.* Call your Registered State Farm Agent, visit statefarm.com[™] or call 1-800-447-4930.



Mutual Funds[™]

Invest with a Good Neighbor[™]

*With Automatic Investment Plan; otherwise initial minimum investment of \$250 is required.

Not
FDIC
Insured

• No Bank Guarantee
• May Lose Value

For more complete information about *State Farm Mutual Funds*, including charges and expenses, ask your Registered State Farm Agent for a free prospectus or call 1-800-447-4930. Read it carefully before you invest or send money. There is no assurance that the Funds will achieve their investment objectives. Investment return and principal value will fluctuate and Fund shares, when redeemed, may be worth more or less than their original cost. *State Farm Mutual Funds* are not insurance products and are offered by State Farm VP Management Corp. (Underwriter and Distributor of Securities Products), One State Farm Plaza, Bloomington, IL 61710-0001.



**Q: HOW DO YOU GAIN ALTITUDE
WHILE ROLLING BACK?**



**A: TOYOTA IS ROLLING BACK PRICES UP
TO \$1,500 ON SELECT 4RUNNERS.**

Toyota has rolled back prices on every new 4Runner by up to \$1,500 on selected models. Which means you can get this legendary SUV starting at only \$26,815.* Not that you give anything up, with standard features like air conditioning, power windows, a 6-speaker CD sound system, remote keyless entry and Vehicle Skid Control (VSC). So see your Toyota dealer for a test-drive. And check out a vehicle known for both going up and coming down.

 **TOYOTA 4RUNNER**

©2001 Toyota Motor Sales, U.S.A., Inc. toyota.com Buckle Up! Do it for those who love you.
*MSRP including delivery, processing and handling fee. Excludes taxes, license, title and other optional or regionally required equipment. Actual dealer price may vary. MSRP of vehicle shown \$27,725.